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REPORT ON MUNICIPAL AND INDUSTRIAL WATER SUPPLY ROGUE RIVER BASIN, OREGON

Public Health Service
Portland, Oregon

June 1959

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REPORT

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ON

MUNICIPAL AND INDUSTRIAL WATER SUPPLY

ROGUE RIVER BASIN, OREGON

Public Health Service
Division of Engineering Services
Reference Room

Prepared at the request of the Portland District, Corps of Engineers, U. S. Army, under authority of THE WATER SUPPLY ACT OF 1958 (TITLE III, PUBLIC LAW 85-500) and a MEMORANDUM OF AGREEMENT between the Secretary of the Army and the Secretary of Health, Education and Welfare, dated November 4, 1958.

Prepared by
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Public Health Service
Region IX
Portland, Oregon
June, 1959

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ROGUE RIVER BASIN

U.S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS

FIGURE 1

INTRODUCTION

This report relates to the municipal and industrial water supply aspects of the Rogue River Basin, Oregon. It has been prepared as part of and is to be considered in connection with a comprehensive study of the Corps of Engineers involving flood control, navigation, hydroelectric power, irrigation, and allied purposes.

The Water Supply Act of 1958, Title III of Public Law 85-500, authorizes the Corps of Engineers to include storage for immediate and anticipated municipal and industrial water supply in Federal multiple purpose projects. The Act recognizes the primary responsibilities of the States and local interests in developing water supplies for domestic, municipal, industrial and other purposes. The Federal Government participates and cooperates with States and local interests in developing such water supplies in connection with the construction, maintenance, and operation of Federal navigation, flood control, irrigation, or multiple purpose projects.

This report is made pursuant to the MEMORANDUM OF AGREEMENT entered into on November 4, 1958, between the Department of the Army, and the Department of Health, Education, and Welfare, covering assistance to be provided by the Public Health Service to the Corps of Engineers in the implementation of the water supply programs of the Corps of Engineers, authorized under the WATER SUPPLY ACT of 1958. The MEMORANDUM OF AGREEMENT was based on the authority of the Public Health Service, contained in the Public Health Service Act, Public Law 78-410, and the Federal Water Pollution Control Act, Public Law 84-660.

The Public Health Service acknowledges the assistance of the Jackson and Josephine County Water Resources Committees; Oregon Water Resources Board; Oregon State Engineer; Oregon State Board of Health; Bureau of Municipal Research; City and Town officials in the Basin; and the Portland District Corps of Engineers in the preparation of this report.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY:

The Rogue River and its tributaries drain approximately 5,100 square miles in the Southwest corner of the State. The Rogue Basin includes nearly all of Jackson and Josephine Counties, a large part of Curry County; and a small part of Klamath, Douglas, and Coos Counties, all in Oregon; and small segments of Siskiyou and Del Norte Counties in Northern California.

Average annual precipitation varies from less than 20 inches in the central valleys to over 120 inches in the coastal mountains. Temperatures are mild in the lower valleys with the average annual growing season near 220 days.

The present economy of the Basin is based upon the natural assets of timber, agriculture, recreation, and minerals. Timber is the major industry in the Basin with an average annual cut for the three major counties estimated at 1,110 million board feet. Agricultural operations, primarily fruit crops, are increasing and more land is being placed under irrigation. Waterbased recreation is becoming increasingly important throughout most of the Basin with many communities depending primarily upon the tourist trade for their economy. Mineral resources are not sufficiently known to project their influence on the Basin economy. Mineral deposits consist of chromium, lode, gold, placer gold, mercury, copper, silver, platinum, manganese, zinc, iron, tungsten, molybdenum, antimony, vanadium, nickel, sand and gravel. Greater utilization of the Basin's natural resources will be dependent on technologic advances as well as economic demands and national defense needs.

The importance of water in the Basin is evidenced by the 4,300 water-rights, totalling nearly 16,000 cfs, existing on the Rogue River and its tributaries. Simultaneous and continuous use of the 4,300 water-rights would require 11,700,000 acre-feet of water annually. The State of Oregon recognizes ten beneficial uses of water for which water-rights may be obtained. The beneficial uses of water are: domestic, municipal, irrigation, power, industrial, mining, recreation, wildlife, fish life, and pollution abatement. No water-rights have been issued for the latter. Water rights for domestic, municipal, industrial and irrigation purposes are classed as consumptive water rights. The average annual discharge of the Rogue River into the Pacific Ocean is 5,661,000 acre-feet. Although there is sufficient volume of water available on an annual yield basis, the problem still exists as having the water available when and where needed to satisfy the consumptive water-rights of 6,550 cfs; 4,782,000 acre-feet annually.

The total water-rights for domestic, municipal, and industrial water usage is less than 3% of the total water-rights in the Basin and amounts to approximately 5.5% of the average annual yield of the Basin. Use of all water-rights simultaneously, if possible, and permissible, would require about 206% of the average annual Basin water yield.

The existing municipal water supplies of the Basin represent about 50,850 acre-feet on an annual basis. Three of the fourteen municipal water systems appear to have adequate water to meet the foreseeable future water demand. Three of the five communities utilizing ground waters believe that additional ground waters are readily available to augment their water supply as the needs arise. The rest of the communities depend upon springs and surface waters to meet both present and future water requirements.

The municipal water requirements for the year 2010 are predicted to be about 64,395 acre-feet annually. This provides for small industrial water users presently in existence in the Basin and accounts for approximately 15% of the municipal water usage. Future industrial water requirements for large water users - mineral, non-chemical fibre, pulp and paper - are estimated to range from 28,890 to 67,440 acre-feet annually. Under present policy this quantity of water must be supplied through municipal water systems.

There are two rather distinct areas where future water supplies must be augmented by the development of surface waters: (1) Ashland - Talent area, and (2) Medford - Grants Pass area. In the Ashland - Talent area development of surface waters in the upper part of the Bear Creek subbasin is indicated. This may include additional development in Ashland Canyon and the utilization of water from the Talent Irrigation District. To obtain water from the Rogue River would necessitate a pumping station and many miles of transmission lines. Additional water needs for this area are estimated to be about 3,310 acre-feet annually. The Ashland - Talent area has been excluded in the determination of annual benefits associated with the proposed Basin development plan. The Medford - Grants Pass area is considered to be the most sutiable for industrial development. This is also the area for which the municipal water requirements are the greatest. Any development above the confluence of Bear Creek and the Rogue River will permit release of waters to the normal stream channel for transmission to the Medford - Grants Pass area to meet water needs there. Water released could also benefit the Gold Beach area.

To arrive at the annual benefits resulting from an increase in water quantity and dependability by the construction of the proposed reservoirs an alternate water source on McNeil Creek, a tributary of Big Butte Creek was studied. Development of this source permits release of waters to the stream for transmission to the Medford - Grants Pass area, or Gold Beach, and also meets the criteria set forth in the Corps of Engineers' manual relative to the cheapest alternative source. A single purpose reservoir having a useable capacity of 20,000 acre-feet would cost about $6.5 million. Total annual charges would be in the order of $ 300,000, or about $15 per acre-foot of usuable storage per year. If demands increase on a straight line basis from the year 1960, that amount of storage could be expected to be substantially under contract by the end of a 10-year interest-free period beginning at the earliest practicable date for project completion. Additional storage sites, in the Upper Rogue area, would remain available for future storage development to satisfy the full anticipated water demand.

Using the cost of water at $15 per acre-foot the annual benefits that may be associated with the proposed Rogue River Basin development plan will range from $617,850 to $1,196,100. These benefits are based upon the predicted annual water requirements for the year 2010 and on the premise that industrial development will be concurrent with the availability of adequate water supply. The benefits pertain only to the Medford - Grants Pass area as follows:

Municipal water supply:

Grants Pass	$100,500
Medford	84,000

Industrial water supply:

Medford - Grants Pass area --------- $433,350 to $1,011,600.

CONCLUSIONS:

(1) The natural and agricultural resources in the Basin constitute a significant potential for future industrial and municipal growth.

(2) The future water requirements associated with municipal and industrial growth cannot be met by the present water resources of the Basin without provision of storage facilities to provide stream flows on a sustained basis during the critical summer period.

(3) Industrial development will be concurrent with the availability of adequate water supply.

(4) If economic development of the Basin is to occur, surface water supplies must be developed to meet the anticipated water needs.

(5) Joint use of stored waters appears to be practicable because of the timing of flood-control and water supply needs and because water releases for power generation will be made available below the reservoirs to meet the anticipated water needs. The areas for which increased water supplies will be needed are so located that stored waters may be transmitted in the natural stream channels and construction of long transmission lines or channels are thus eliminated.

(6) Technological advancement will lead to fuller utilization of the Basin resources and undoubtedly will affect the water requirements in the Basin.

(7) Construction of storage reservoirs is a step toward conservation of one of the basin's most important resources.

(8) On the basis of anticipated water requirements for the year 2010 and the $15 per acre-foot value of water developed for the alternative water supply, the annual benefits that may be associated with the proposed Basin Development Plan will range from $617,850 to $1,196,100.

RECOMMENDATIONS:

It is recommended that:

(1) Periodic review be made of economic growth that may occur with advance in technological knowledge, resulting in greater utilization of the Basin's natural resources.

(2) Storage should be included in either, or a combination of, Elk Creek, Lewis Creek, Lakecreek, and Meadows reservoirs to meet the estimated future demand for municipal and industrial waters in the Medford-Grants Pass area. The stored waters could also be released to meet water demands that may materialize in the Gold Beach area.

(3) Consideration should be given to inclusion of water storage to satisfy water demands in the Gold Beach area in future developments of Copper reservoir. Such demands are presently indeterminate.

(4) Consideration should be given to future development of storage reservoirs in the Upper Bear Creek Sub-Basin in anticipation of future water requirements for the municipalities of Ashland, Talent, Phoenix, and Medford.

(5) The value of $15 per-acre-foot-per-year should be taken into account in estimating the annual benefits and economic value associated with inclusion of storage space in the proposed Basin development for future municipal and industrial water supplies.

(6) The municipalities and industries in the Basin be alert to the provisions of the Water Supply Act of 1958 in obtaining water storage space in Federal reservoirs to facilitate meeting future water requirements.

PROJECT PLAN

Section 6 of the 1936 Flood Control Act and Section 206 of the 1958 Flood Control Act authorizes the Corps of Engineers to prepare a comprehensive survey report for flood control and allied purposes for the Rogue River Basin.

The tentative storage plan under consideration by the Portland District of the Corps of Engineers includes five reservoirs, one each on the main stem of the Rogue River, Elk Creek, Little Butte Creek, East Fork of Evans Creek, and Applegate River. The Lewis Creek project on the Rogue River main stem, about one mile above Trail, has previously been considered but is now replaced by the Elk Creek and the Lost Creek projects, having a combined storage equivalent to the Lewis Creek project.

TABLE 1 summarizes selected data on the proposed storage projects for the Rogue Basin.

TABLE 1

PROPOSED ROGUE RIVER BASIN STORAGE PROJECTS

Reservoir	Stream	Project Location	Storage 1/ (acre-feet)	Project Purpose 2/
Lost Creek	Rogue River	NW 1/4, Sec. 2, T34S, R1W	238,000 T 74,000 D 164,000 U	FC, I, P, R
Elk Creek	Elk Creek	NE 1/4, Sec. 20 T33S, R1E	62,000 T 2,000 D 60,000 U	FC, I, R
Lake Creek	Little Butte Creek	SE 1/4, Sec. 19 T36S, R2E	42,400 T 7,000 D 35,400 U	FC, I
Meadows	East Fork Evans Creek	SW 1/4, Sec. 20 T34S, R2W	15,200 T 100 D 15,100 U	FC, I, R
Copper	Applegate River	NW 1/4, Sec. 36 T40S, R4W	72,000 T 17,000 D 55,000 U	FC, I, P, R

1/ T, Total Storage; D, Dead Storage; U, Usable Storage

2/ FC, Flood Control; I, Irrigation; P, Power Generation; R, Low Flow regulation

DESCRIPTION OF THE AREA

The Basin divides into three distinct sections - Eastern, Central Valley, and Western - each differing in topography, climate, and degree of development. Condensed area, population, and climatological data for these three sections are given in TABLE 2.

TABLE 2

Section	Approximate Area and Population	Largest Communities and Population	Average Annual Climatological Data		
			Precipitation (Inches)	Temperature (°F)	Growing Season (days)
			1st Line lower elevations 2nd Line high elevations		
Eastern	1,500 sq. mi. 1,400	Shady Cove 500	30 70	32 - 92 17 - 70	180
Central Valley	2,600 sq. mi. 95,000	Medford 24,300 Grants Pass 9,900 Ashland 8,800	20 - 60 - -	32 - 92 32 - 75	220
Western	1,000 sq. mi. 2,800	Gold Beach 1,950	60 - 90 120	40 - 60 32 - 75	280

The Oregon State Water Resources Board has divided the Rogue River Basin into seven sub-basins, TABLE 3 presents selected physical data for these sub-basins. The appendix, Figures I through VII, presents maps for these sub-basins.

TABLE 3

ROGUE RIVER SUB-BASINS

Sub-Basins	Major Tributaries	Incremental Area (sq. Mi.)	Total Sub-Basin Area (sq. mil.)
1. Upper Rogue	Big Butte Creek Elk Creek S. Fork Rogue River	253 135 245	1250
2. Little Butte Cr.	S. Fork L. Butte Cr.	138	374
3. Bear Creek	Ashland Creek Emigrant Creek Jackson Creek	-- -- --	340
4. Applegate Valley	L. Applegate River Williams Creek	117 85	768
5. Middle Rogue	Evans Creek Grave Creek Jumpoff Joe Creek Pleasant Creek Wolf Creek	218 164 110 38 46	943
6. Illinois Valley	Deer Creek E. Fork Illinois River Sucker Creek	110 190 94	982
7. Lower Rogue	--	--	503
TOTAL ROGUE RIVER BASIN AREA			5,160

GOVERNMENTAL ORCANIZATION

Distribution of the Rogue Basin area by counties is shown in TABLE 4.

TABLE 4

AREAS OF COUNTIES LYING WITHIN THE ROGUE RIVER BASIN

COUNTY	STATE	AREA WITHIN ROGUE BASIN	
		SQUARE MILES	ACRES
Jackson	Oregon	2,503	1,602,000
Josephine	Oregon	1,645	1,052,000
Curry	Oregon	533	341,000
Klamath	Oregon	217	139,000
Douglas	Oregon	113	72,000
Coos	Oregon	2	1,000
Siskiyou	California	88	56,000
Del Norte	California	59	38,000
	TOTAL	5,160	3,301,000

Oregon cities refer to their charters for the primary authority to own and operate water systems. The required authority is found either as an express grant or as a general grant of powers. For those cities operating without a charter, the State Incorporations Act provides the necessary authority to own and operate water systems.

ORS 225.020 supplements the city charter and authorizes cities to build, own, operate, and maintain water works and water systems both within and without the city limits for the benefit and use of the inhabitants and for profit.

ORS 225.30 provides the authorization for a city having a water system to supply water to anyone inside or outside the city limits.

ORS 225.050 specifically grants authority for cities to construct, own or operate a water system jointly.

ORS 264.10 provides that communities may be incorporated as municipal corporations for the purpose of supplying their inhabitants water for domestic purposes. This Act further provides that any surplus water over and above the domestic needs of the inhabitants may be furnished to any persons, corporations, or associations, either within or without the district, or to other communities, water districts, or municipal corporations.

ORS 264.230 provides that the boundary lines of any municipal corporation created under ORS Chapter 264 include only that territory as may in reason be served by the corporation's water supply or system.

ORS 264.240 provides the water district the rights and powers of eminent domain and of purchasing, selling, condemning and appropriating real property, water, water rights, and riparian rights.

ORS 264.250 provides the water district with authority to raise money by selling of bonds within limits specified in the Act.

ECONOMIC DATA

The economy of the Rogue Basin is based upon timber and its products, agriculture, minerals, and recreation.

Timber operations are the major industry in the Basin with market conditions affecting the log production rate. Approximately 75% of the Basin land is in timber, with about 95% of this area capable of producing marketable timber. The State of Oregon and the Rogue River Basin are major suppliers of timber. The average annual cut for the three major counties in the Basin, for the period 1947 to 1957, has been estimated at 1,110 million board feet.

Timber operations form the major base of employment in both Jackson and Josephine counties. These counties include about 80% of the Basin area. Approximately 38% and 52% of covered employees in Jackson County and Josephine County, respectively, work in timber processing, field logging, sawmilling, and plywood production. Employment in these operations is subject to the economic conditions in the county as well as seasonal shutdowns or limitations induced by national market conditions.

Future economic development in the Basin depends importantly on the construction of facilities to process and use not only new cutting, but timber resources presently being wasted. The average annual waste in the timber industry is estimated at 40% of the total cut. A report entitled "Rogue River Valley Pulp and Paper Development Study, March 31, 1958," submitted to the Oregon Development Commission, Sandwell & Company, Inc., states that sufficient raw materials from sawmill and veneer plant residues are available to support a new kraft pulp and paper mill with an initial capacity of 300 tons per day. The availability of raw materials is based on the existence of 36 sawmills and 8 green veneer mills in the study area.

Initially, the Basin economy was based upon mining, following the gold discovery in California. While mining development was very rapid, the economy soon became centered around agriculture as mining declined. Mining activities today fluctuate substantially, never reaching a very high peak.

In 1954, the census of mineral industries listed 49 mineral industry establishments - 24 mining chromium ores, 7 lode gold, 6 placer gold, 2 mercury ores, 1 copper ore, 4 common sand and gravel, and the remainder unclassified.

Other mineral deposits existing in scattered locations are silver, platinum, manganese, zinc, iron, molybdenum, antimony, vanadium, nickel, and tungsten. Cement rock from quarries in Josephine County is trucked

to the cement plant at Gold Hill for processing. Carbon dioxide is recovered from the water of ten deep wells near Ashland and is compressed into cakes of dry ice. High-grade silica produced at Rogue River, in Jackson County, is processed to obtain elemental silicon.

Oregon is one of the few states which has reserves of metallurgical grade chromite. All of the ore produced from 24 mines and 17 mills was sold to the General Services Administration stockpile at Grants Pass. With the suspension of the GSA purchasing program in 1958, the State' chrome mines and mills were shut down. Chromite ore was produced in Coos, Curry, Douglas, Jackson, and Josephine Counties in Southwestern Oregon and Grant County in Central Oregon. There has been extensive exploration for nickel in the vicinity of Cave Junction and Gold Beach. Nickel production at Riddle, Douglas County, has been an important factor in the economy of the county.

Some coal deposits occur in the Bear Creek Sub-basin and to a lesser extent in the extreme Northwestern part of the Illinois Valley Sub-Basin. No oil deposits have been found in the basin, although explorations have been made in the area bordering the Lower Rogue Sub-basin on the North along the coast.

The minerals are in effect "in storage" until needed. The mineral resources of the Basin are not sufficiently known to project adequately the magnitude of industrial growth that would result from their utilization. In times of national emergency with the advancement of technological knowledge it is probable that the mining would be of great importance to the economy of the Basin. This was experienced during World War II when the Federal Government purchased and stockpiled vital minerals for use in national defense.

A generalized mineral localities map developed by the Oregon State Department of Geology and Mineral Industries is shown in FIGURE 2.

Fruit packing and processing industries operate primarily in the Bear Creek Sub-basin. The size of this industry does not exert much influence on the Basin's economy. Employment has been cyclic and seasonal. An increase in gift pack activities and utilization of cold storage facilities has tended to stabilize employment for some workers.

Recreation provides the base of an important tourist industry. Most active development occurs in the central valley, eastern section, coastal area, and the lower 27 miles of the Rogue River. Many communities depend primarily upon tourist trade for their economy. Water-based recreation is becoming increasingly important throughout the Basin. It is anticipated that water-based recreational activities will increase following construction of storage reservoirs in the Basin.

Prior to 1940, agriculture was the primary industry in the Basin. It has since been outranked by the timber industry. Approximately 9% of

GENERALIZED MINERAL LOCALITIES MAP

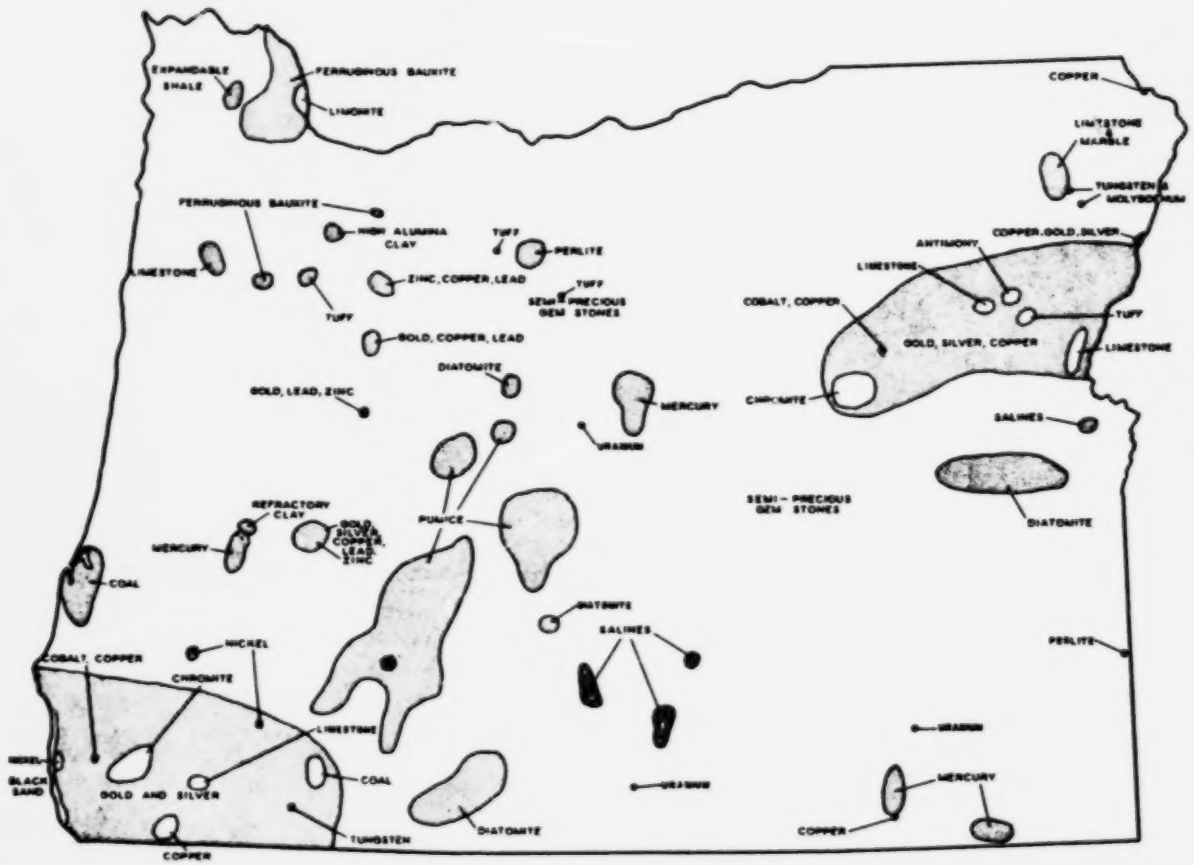


FIGURE 2

the Basin area is used for agricultural purposes. Over half of this area is dry pastureland. The precipitation pattern is such that dry farming is not profitable.

There is much undeveloped land, potentially irrigable. A portion of the land presently irrigated does not receive adequate irrigation water. The Bureau of Reclamation has the Talent Project under construction and upon its completion, water will be available in the upper section of the Bear Creek Sub-basin. Bear Creek Valley has the most extensively developed agricultural lands in the Basin.

The labor force for the three major counties - Curry, Jackson, and Josephine - distributed by industrial groups as reported in Department of Commerce County Business Patterns, Part 10, 1st Quarter, 1956, is shown by TABLE 5.

TABLE 5

LABOR FORCE

INDUSTRIAL GROUP	COUNTY		
	CURRY	JACKSON	JOSEPHINE
Agricultural Services		32	6
Mining	1/	104	66
Contract Construction	76	578	164
Manufacturing	1736	4340	2316
Food and Kindred Products	--	205	--
Lumber and Wood Products	1653	3563	2178
Logging	1/	526	388
Sawmills and Planing Mills	618	2365	1179
Millwork, Plywood and Prefabrication	627	658	535
Public Utilities	66	1136	332
Wholesale Trade	38	1045	133
Retail Trade	284	2720	1170
Finance, Insurance, Real Estates	50	412	165
Services	141	1311	599
Industry and Commerce (Total)	2411	11743	4995

1/ Figures Withheld

All counties in the Basin have experienced a rapid rate of growth since 1940. TABLE 6 shows the composite population figures for the three major counties in the Basin from the year 1860 through 1958. Also shown on this table is the per cent of change experienced by each county between the census years. A graphical presentation of the population growth for the three major counties by county is shown in FIGURE 3. *

TABLE 6 *

COUNTY POPULATION GROWTH

	COUNTY					
	Jackson		Josephine		Curry	
Census Year	Population	Per cent Change	Population	Per cent Change	Population	Per cent Change
1860	3,736		1,623		393	
		27.9		-25.8		28.2
1870	4,778		1,204		504	
		70.7		106.4		139.7
1880	8,154		2,485		1,208	
		40.5		96.3		41.5
1890	11,455		4,878		1,709	
		19.6		54.1		9.3
1900	13,698		7,517		1,868	
		88.0		27.3		9.4
1910	25,756		9,567		2,044	
		-20.8		-20.0		48.0
1920	20,405		7,655		3,025	
		61.3		50.2		7.7
1930	32,918		11,498		3,257	
		10.0		41.8		32.1
1940	36,213		16,301		4,301	
		61.6		62.8		40.6
1950	58,510		26,542		6,048	
		17.3		9.5		109.8
1958 **	68,660		29,070		12,690	

* The figures used in TABLE 6 and FIGURE 3 are for the entire county and not just for that area of the county within the Basin.

** Certified population by Oregon State Board of Census.

COUNTY POPULATION GROWTH

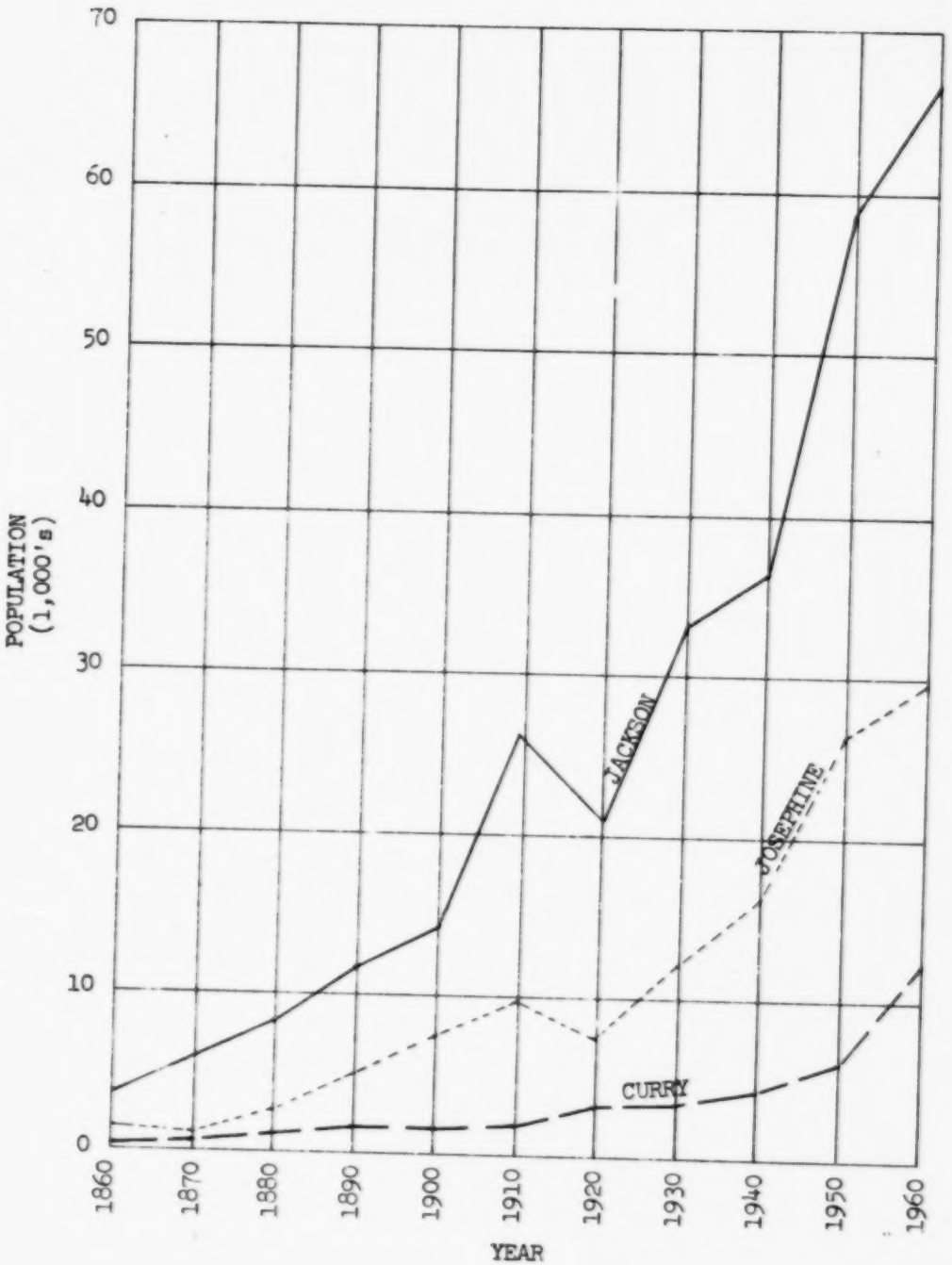


FIGURE 3

The population growth for the incorporated cities of the Basin (1890-1957) for which water supply studies have been made appears in TABLE 7. This table also indicates the percentage change in population between the census years for each of the cities from the census year nearest their date of incorporation.

A graphical presentation of the population growth from the 1920's to the present and the predicted population growth to 2010 is shown in FIGURES 4, 5 and 6. Future population trends for the years after 1957 are based on estimates made by the municipalities. From these data it is apparent that the major population growth is expected to occur in the Bear Creek Sub-basin, followed by the Middle Rogue Sub-basin and the Lower Rogue Sub-basin, in decreasing order.

TABLE 7

CITY POPULATIONS AND PERCENT CHANGE IN POPULATION

	Census Year and Percentage Change													
	1890		1900		1910		1920		1930		1940		1950	1957
Ashland	1,784	47.6	2,634	90.6	5,020	-14.7	4,283	6.1	4,544	4.4	4,744	63.1	7,739	8,750
													13.1	
Butte Falls	--	--	--	--	--	--	166	79.5	298	13.8	339	9.7	372	362
													-2.7	
Cave Junction	--	--	--	--	--	--	--	--	--	--	--	--	283	300
													6.0	
Central Point	534	-39.7	322	136.3	761	-23.2	582	41.1	821	10.4	906	84.0	1,667	2,050
													23.0	
Eagle Point	--	--	--	--	--	--	128	64.8	211	15.2	243	149.8	607	711
													17.1	
Grants Pass	1,432	59.9	2,290	70.2	3,897	-19.1	3,151	48.1	4,666	29.2	6,028	34.6	8,116	9,986
													23.0	
Gold Beach	--	--	--	--	--	--	--	--	--	--	--	--	677	1,900
													180.6	
Gold Hill	--	--	385	9.9	423	-0.2	422	19.0	502	6.8	536	15.5	619	655
													5.8	
Jacksonville	743	-12.1	653	20.2	785	-37.7	489	44.4	706	7.8	761	56.9	1,193	1,166
													-2.3	
Medford	967	85.2	1,791	393.6	8,840	-34.9	5,756	91.2	11,007	2.5	11,281	53.4	17,305	23,571
													36.2	
Phoenix	--	--	--	--	250	-36.4	159	176.1	439	-1.6	432	72.7	746	731
													-2.0	
Rogue River	--	--	--	--	--	--	211	35.5	286	33.9	383	54.0	590	600
													1.7	
Talent	--	--	--	--	--	--	278	51.4	421	-9.5	381	94.0	739	895
													21.1	

POPULATION GROWTH
MUNICIPALITIES
1920 - 2010

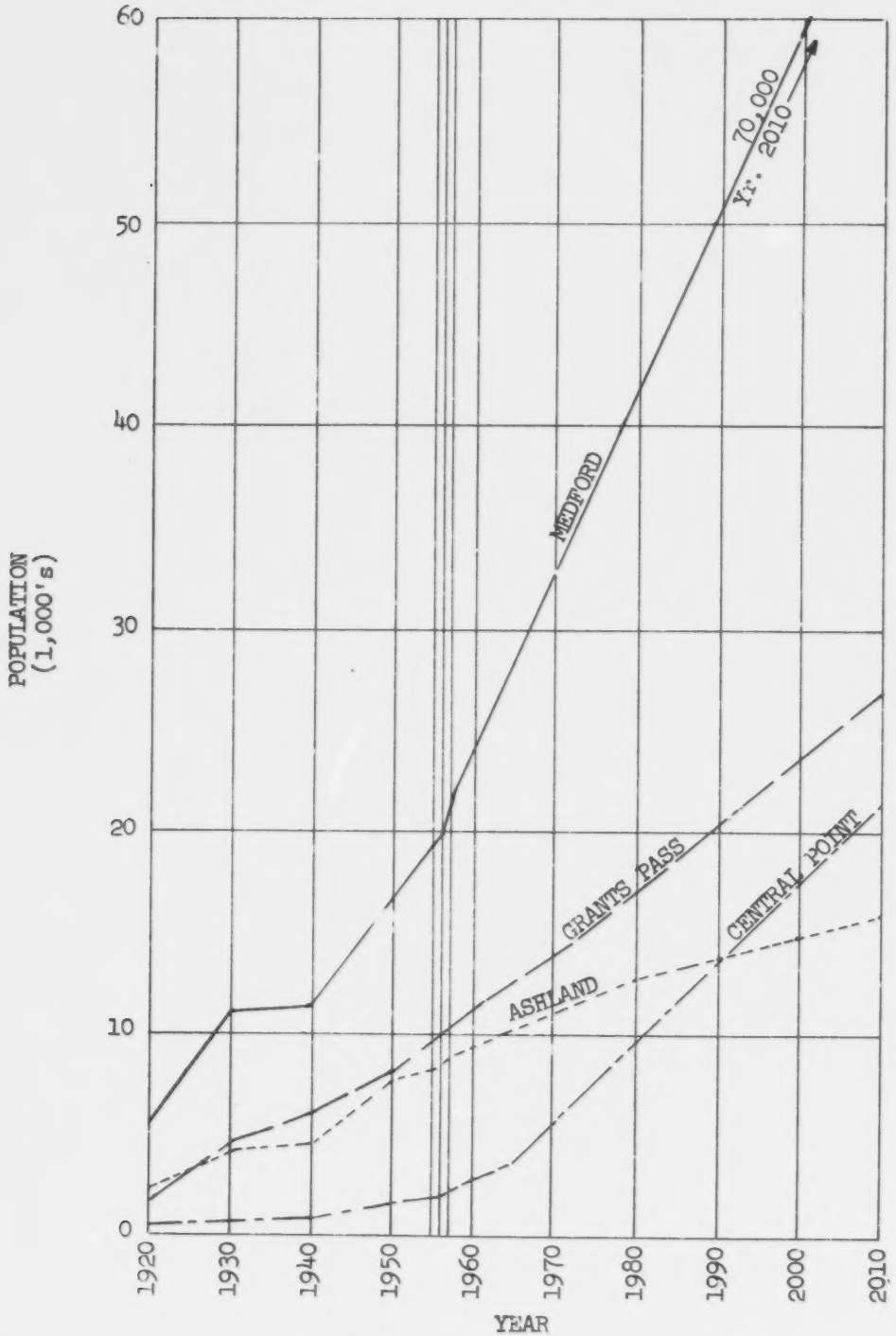


FIGURE 4

POPULATION GROWTH
MUNICIPALITIES
1920 - 2010

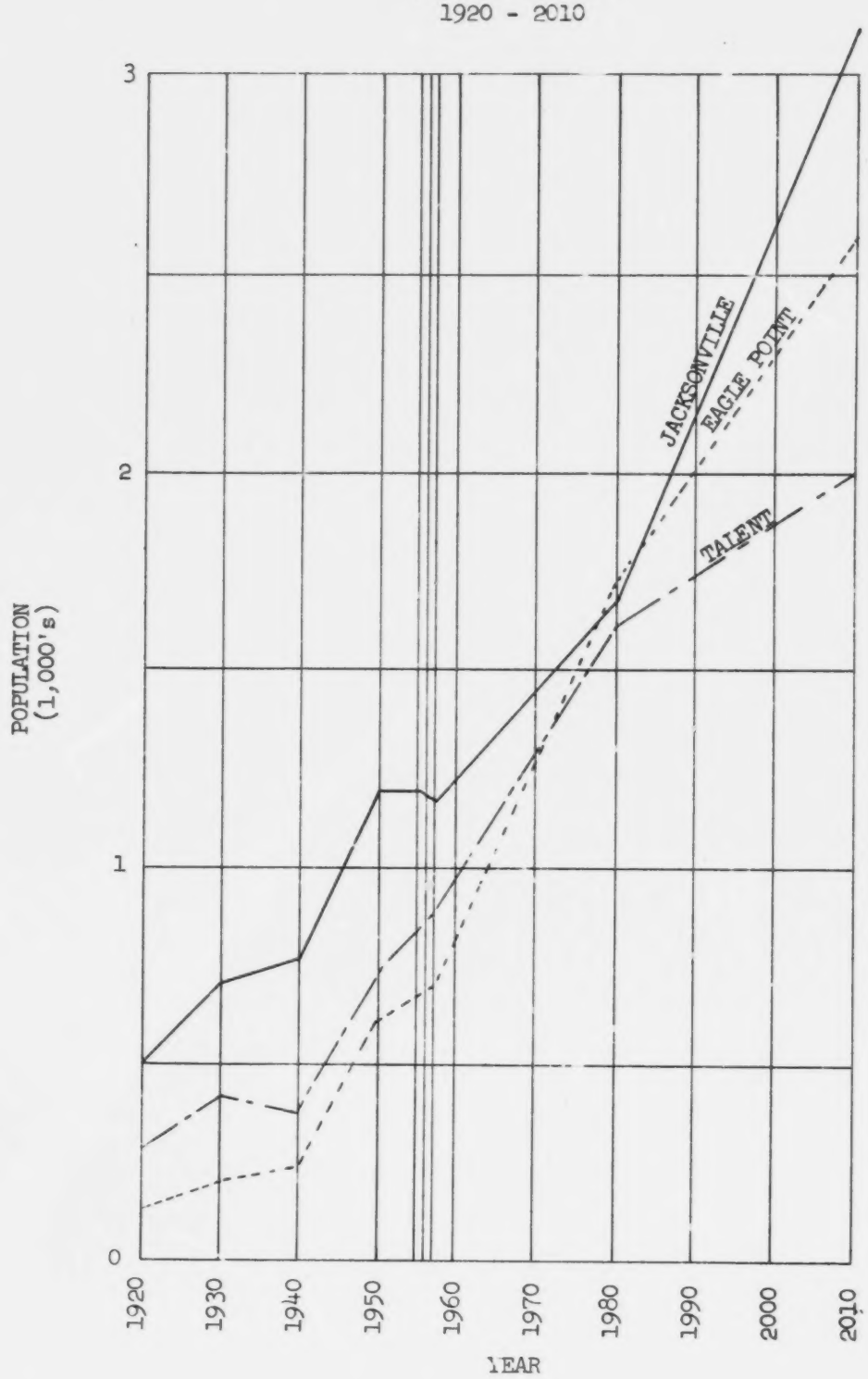


FIGURE 5

POPULATION GROWTH
MUNICIPALITIES
1920 - 2010

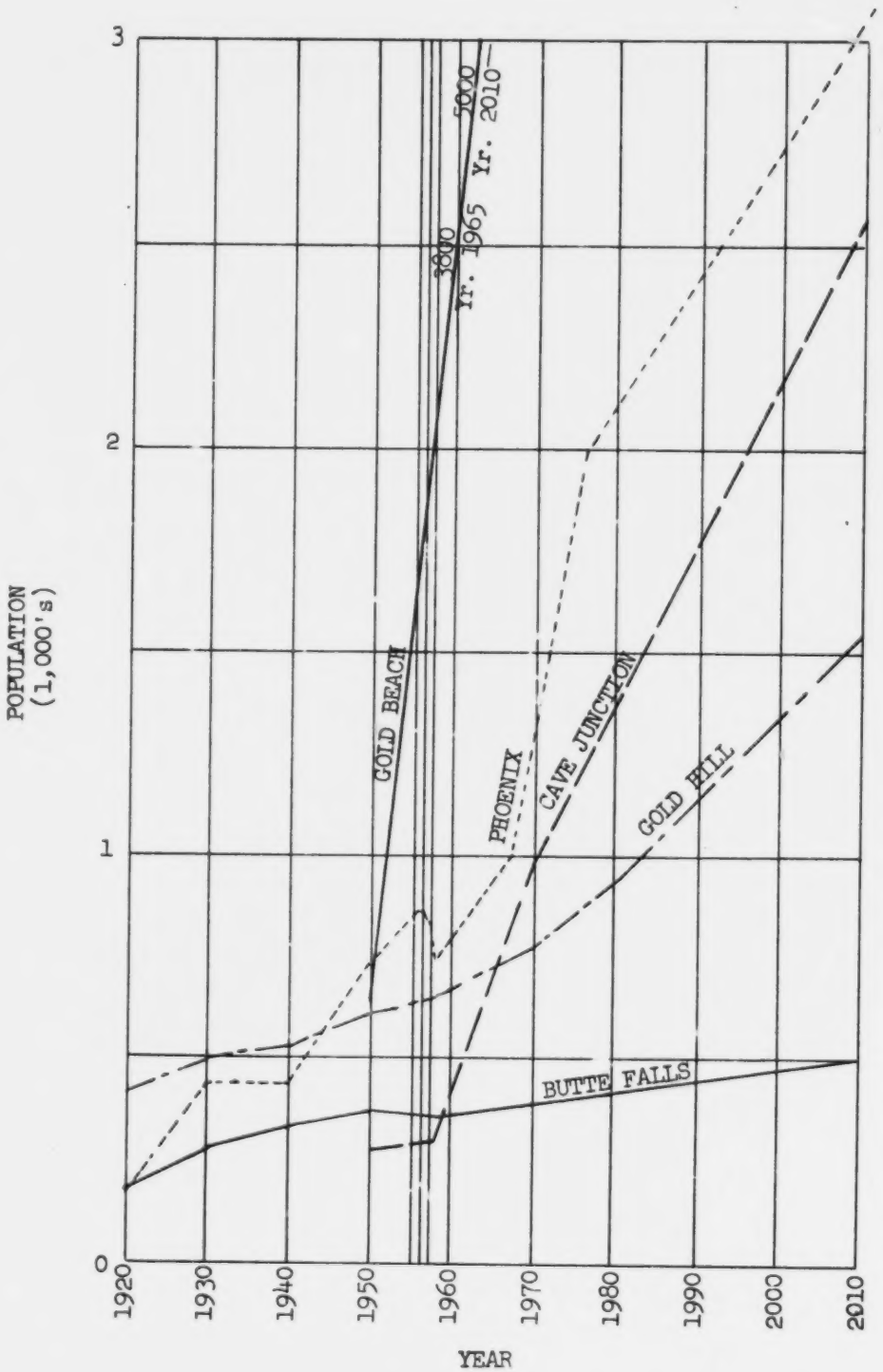


FIGURE 6

PRESENT USE OF BASIN WATER RESOURCES

Sufficient water exists in the Basin, based on the annual yield, to meet present demand and estimated future needs. Basin streams follow the pattern of nigh flows during the winter months and low flows during the summer and fall months. Many of the smaller streams experience extreme low flows, becoming dry in some instances, during late summer and early fall.

DOMESTIC:

Ground water is the major source of domestic water supplies in the Basin. The Josephine County Water Resources Committee estimates that 5,800 wells are being used to supply domestic water demand. Approximately 90% of these wells are 50 feet or less in depth. Of the estimated 6,500 families served by domestic water supplies, approximately 10% utilize surface water sources.

With the exception of water districts close to the City of Medford and along the route of the City's aqueducts from Big Butte Springs, underground water presently provides the requirements of the rural population. The Jackson County Water Resources Committee estimates that at least 50% of the present underground domestic water supplies are unsatisfactory in both quantity and quality. A few areas have sufficient ground waters to supply a high density of population, but in general, the ground waters of Jackson County are not of sufficient quantity to supply a population density of over one person per two acres. This is particularly true in the more desirable foothill locations.

In the Gold Beach area, the only dependable source of domestic water supply is the Rogue River. Domestic water-rights total 33 cubic feet per second (cfs) for the entire Basin. These rights are scattered throughout the Basin, and are intended for stock, camp, parks, and household uses although many of the earlier rights were for purposes which now would come under the municipal classification.

INDUSTRIAL:

Industrial water-rights for the Basin total about 67 cfs and are primarily concentrated in the Medford and Grants Pass area. The present industrial water demand is small and of such a nature that water quality does not present any serious problems. Conversely, industry occasionally exerts an undesirable effect on surface water quality. Present industrial water use is primarily for mill ponds and boilers. The cities of Medford and Grants Pass estimated that about 15% of their total usage is industrial.

Actual mining use of water in the Basin is very low; however, water-rights for mining purposes total about 4000 cfs. Many of these water-rights are for placer mining operations and have seasonable restrictions as part of the water-right. The major use of water for mining is in sand and gravel operations and intermittent mining for gold.

MUNICIPAL:

There are approximately 15 municipal water systems in the Basin. Of these, 10 utilize springs and/or surface waters and 5 utilize ground waters, supplying an estimated population of 50,000. The Water Resources Committees for Jackson and Josephine Counties report that the present quantity of water available for municipal use is sufficient and that most communities feel that the foreseeable future water demand can be met without any great difficulty, provided that they are not required to supply large volumes of industrial water. Some of the small communities that are presently depending upon ground water supplies feel that their future needs will be met by construction of additional wells. A few of the small communities contemplate use of the Rogue River to augment their future needs.

TABLE 8 has been prepared from data obtained by the Jackson and Josephine Counties Water Resources Subcommittees:

TABLE 8
EXISTING WATER USAGE
DATA

City	Population Served	Average Annual Water Usage (1000 gallons)	Acre-Feet	Gal. Per Cap. per day Maximum	Average
Ashland	9,520	977,000	3,000	750	280
Gold Beach	1,925	113,500	395	245	190
Gold Hill	655	73,400	225	310	205
Grants Pass	10,903	777,000	2,390	515	195
Medford	33,930	2,960,000	9,105	540	240
Phoenix	773	86,500	265	310	205
Talent	958	42,400	130	195	120
		AVERAGE *		570	240

* Average daily per capita water consumption is above the national average due to lack of individual meters and the availability of present water supplies.

Municipal water-rights for the entire Basin total 331 cfs with the City of Medford holding water-rights of 262 cfs. Ninety-five percent of Medford's water-rights are for use by the Eagle Point Irrigation District to compensate for water diverted by the City from Big Butte Springs. Industrial needs, in most cases, must be met with municipal supplies.

ASHLAND:

The municipal water supply is obtained by impounding Ashland Creek approximately three miles south of the city. Three dams have been constructed with a total impoundment of 800 acre-feet of water. The Ashland Creek watershed comprises approximately 140 square miles, 3% owned by the city and the remainder lying within the Rogue River National Forest. Complete water treatment facilities having a capacity of approximately 8 mgd were constructed in 1949.

With the predicted future population and water use at the present maximum per capita rate (750 gal. gpd), the existing water supply should be adequate until the year 1965. This includes future industrial water use, at the present rate, but excludes irrigation waters that are supplied through a separate system and obtained from the Talent Irrigation Project.

Water treatment costs on a yearly basis average approximately $5/mg; however, chemical coagulation is not utilized continuously throughout the year. Utilization of other surface water supplies that may become available will require continuous treatment which will increase the cost/mg.

BUTTE FALLS:

The municipal water supply is obtained from springs on the West Fork of Ginger Creek approximately one mile southeast of the city. Three springs have been developed by the construction of concrete spring boxes and protected from surface water contamination. Another spring is maintained as an auxiliary supply and has not been completely developed. No treatment is provided to the water.

The existing source can supply approximately 600,000 gpd. The average daily per capita water consumption for cities under 500 population in Oregon is about 95 gallons. The average daily per capita water consumption in the United States is predicated to be about 160 gallons by 1975. Using this as a basis, the existing water supply would be adequate to serve a population of about 3,700 people. Future population predictions for this locality indicate that the existing supply is adequate.

CAVE JUNCTION:

The existing water supply is obtained from a shallow well, about 20 feet deep, located in the uninhabited high area just east of the town. The installed pumping facilities can produce 350 gpm, and tests made at the time the well was established indicated that a flow of 500 gpm is available from the aquifer. The maximum daily per capita water consumption over the past five years has been about 320 gallons. This amounts to approximately one-fifth of the presently installed pumping facilities.

No water treatment facilities are presently utilized.

CENTRAL POINT:

Water purchased from the city of Medford.

EAGLE POINT:

Water purchased from the city of Medford.

GOLD BEACH:

A small dam located on Indian Creek approximately one mile northeast of town impounds surface waters to supply the municipal water demands. Use of this water is curtailed as much as possible when the turbidity is high. The water is chlorinated and pumped into the water distribution system. One shallow well, 36 feet deep and 10 feet in diameter, is also utilized as a source of domestic water supply primarily during the rainy season when high turbidities occur in the surface supply. The well was constructed in 1957 in the old river bed which is about 600 feet from the present Rogue River channel. Well water is not treated.

With the existing facilities about 540,000 gallons of water per day is available, utilizing both the surface and ground water supplies simultaneously. The present maximum daily per capita water consumption is about 245 gallons, with an average consumption of about 190 gallons.

GOLD HILL:

The Gold Hill municipal water supply is obtained from the Rogue River. All water is being directed into two reservoirs located approximately one-half mile from the center of town. Some settling occurs in the reservoirs and water entering the distribution system is chlorinated. Since no metering facilities are available, the water usage figures shown in TABLE 8 are estimated. Under the agreement dated July 6, 1926, between the city and the Ideal Cement Company, the cement company is to supply, pump, and deliver into the city's water main at the pumping plant, free of charge, all water which may be required for domestic and municipal uses. Records indicate that the city has a 3 cfs water-right on the west bank of the Rogue River immediately above the city.

GRANTS PASS:

The city of Grants Pass is the second largest water user in the Basin and holds a water-right for 12 cfs (7.75 mgd) from the Rogue River. The city has a complete water filtration plant with a capacity of about 5 mgd.

The maximum per capita consumption is approximately 515 gpd with an average per capita consumption of about 195 gpd. These figures include industrial water use which has been estimated to be equivalent to about 15% of the total water demand. The city intends to have an engineering survey made of the municipal water system during the fiscal year 1960 with special emphasis on determining the necessary improvements to meet the city's needs until about 1975.

JACKSONVILLE:

Water purchased from the city of Medford.

MEDFORD:

The city of Medford is the major water user in the Basin and holds exclusive rights to the waters of Big Butte Creek subject only to the water-rights existing prior to 1925. The water from a series of springs, located approximately 30 miles from the city, is collected in a concrete gallery and tunnel. The capacity of the existing development of the Big Butte springs has been computed to be about 38.7 cfs (25 mgd). Additional water is available at the springs location, however, considerable development is necessary in order to utilize this water. The city estimates that the existing water supply will be sufficient to meet the water demand until approximately 1968 on the basis of the maximum per capita demand extending over the entire year. The average daily water use in 1957 was about 10 mg. This supply permits gravity flow from the springs to the city.

In anticipation of future water supply needs the city has obtained a water-permit for 100 cfs on the Rogue River at about river mile 132. Assuming that water is available in the river to satisfy this water-permit, the city water department would be in a position to meet the future water needs for both municipal and industrial use.

PHOENIX:

The town water supply is obtained from the deep wells approximately three-fourth mile south of town, and an auxiliary water supply from a spring approximately one-eight mile southwest of the well. The water is chlorinated at the wells. About 390,000 gallons per day is available from the wells. The maximum daily per capita water consumption is 310 gallons, and the average is 305 gallons. On the basis of the daily per capita consumption and the predicted population growth the existing water supply would be adequate until about 1985.

PROSPECT:

The water supply for the town is obtained by diversion from Mill Creek and is distributed by a private water company. Chlorination only is practiced. No data are available on either water consumption or adequacy of the water supply.

ROGUE RIVER:

The municipal water supply is obtained from a dug well, 40 feet deep and 96 feet in diameter, and a drilled well, 100 feet deep and 6 inches in diameter, with a combined capacity of 550 gpm. The dug well is located in the high areas immediately east of town. The drilled well which is located in the park area along the Rogue River must be abandoned because of proposed highway construction. City officials are presently seeking satisfactory location for the construction of a new well.

The Rogue River, at the south side of the town, has previously been utilized as an auxiliary water supply. No treatment facilities have been utilized except chlorination.

No water use data or predicted future population figures are available. City officials assume that adequate ground water supplies may be developed as the water demand increases.

TALENT:

Ground water supplies are utilized to provide the municipal water demands. One dug well located in the southwest part of town is 40 feet deep and about 14 feet in diameter with perforated pipe extending horizontally from the bottom of well. Another well in the same general area is 150 feet deep and 6 inches in diameter. Another shallow well, in the south part of town and about 100 feet from Wagner Creek, is 20 feet deep and has a 30 inch diameter perforated tile extending 300 feet horizontally from the bottom at approximately 45° angle with the creek. The municipal water supply is chlorinated.

The available water use figures are for the year 1957 and include a period during which water restrictions were necessary. Under these conditions the daily per capita water consumption ranged from 120 to 195 gallons. Additional water supplies must be obtained.

WATER QUALITY

The Oregon State Board of Health has adopted Health Standards for safe practice in the production and delivery of water for domestic use. These standards set forth the minimum requirements of design, construction, maintenance, and operation of water utility systems. These standards are summarized below:

All water supply facilities should be constructed with ample safety factors in regard to physical stresses and should be free from structural or sanitary hazards. Source facilities should be adequately developed to prevent entry of foreign matter into the system.

BACTERIOLOGICAL QUALITY:

Samples for bacteriological examination must be collected from representative points in the distribution system with sufficient frequency to establish the safety of the water in all parts of the system. The bacteriological standards delimit the density of coliform bacteria in the water and in general imply that the water must not contain more than a single coliform organism in 100 milliliters (ml.). The coliform group of bacteria has as one of its primary habitats the intentinal tract of human beings. Hence the presence in water of members of the coliform group is an indicator of the potential presence of other organisms that originate in the human intestinal tract.

Water which is not obtained from a natural source free from pollution shall not be delivered for domestic use unless it is adequately purified by natural agencies or adequately disinfected by artificial treatment to insure compliance with bacteriological standards as follows:

Of all the standard 10 ml. portions examined per month in accordance with the specified procedure, not more than 10% shall show the presence of organisms of the coliform group.

Occasionally 3 or more of the 5 equal 10 ml. portions constituting a single standards sample may show the presence of organisms of the coliform group, provided that this shall not be allowable if it occurs in consecutive samples or in more than -------

(1) Five % of the standard samples when 20 or more samples have been examined per month.

(2) One standard sample when less than 20 samples have been examined per month.

Provided further, that, when 3 or more of the 5 equal 10 ml. portions constituting a standard sample show the presence of organisms

of the coliform group, daily samples from the same sampling point shall be collected promptly and examined until results obtained from at least two consecutive samples show the water to be of satisfactory quality.

PHYSICAL AND CHEMICAL QUALITY:

In addition to the bacterial standards above, water quality standards pertaining to physical and chemical characteristics are also used to measure the water quality for human consumption.

Four types of toxic contaminants may conceivably be encountered in public water supplies under normal conditions:

(1) natural contaminants in water that has come into contact with poisonous mineral formations;

(2) natural contaminants in water associated with specific aquatic growths;

(3) acquired contaminants that enter water from waterworks structures or treatment practices;

(4) acquired contaminants traceable to industrial and similar wastes that have been discharged into water courses.

The natural mineral contaminants include the elements fluorine, selenium, arsenic, and boron. With the exception of fluorine, these natural contaminants are seldom encountered in sufficient concentration in drinking water to cause damage. The mottling of teeth is associated with excessive fluorides in drinking water. Small amounts of fluorides, on the other hand, appear to reduce the prevalence of dental caries. Therefore, fluorides must be regarded as both beneficient and dangerous minerals.

Ordinarily water containing poison associated with specific aquatic growths would be too repulsive to man to endanger him. However, this possibility cannot be completely discounted.

Contaminants acquired within the distribution system by corrosion of metallic pipes are often the reason for consumer complaints. Among the metals employed in water works systems, lead is the only one of proved toxicity. Copper, zinc, and iron are objectionable because they impart a metallic taste to the water when present in significant amounts. They may also cause color in the water and discolor fabrics and plumbing fixtures.

Numerous kinds and varieties of toxic contaminants may be associated with discharge of industrial and similar wastes into water courses. Among these are cyanides and hexavalent chromium.

The recommended physical and chemical quality standards are as follows:

(1) Turbidity of water shall not exceed 10 ppm (silica scale).

(2) Color shall not exceed 20 (platinum - cobalt scale).

(3) The water shall have no objectionable taste or odor.

(4) Total solids shall not exceed 500 ppm for a water of good chemical quality. However, if such water is not available, a total solids content of 1000 ppm may be permitted.

(5) Soluble mineral substance limitations as follows:

(a) Lead less than 0.1 ppm
(b) Fluoride less than 1.5 ppm
(c) Arsenic less than 0.05 ppm
(d) Selenium less than 0.05 ppm
(e) Hexavalent chromium less than 0.05 ppm

Presence of these minerals above the specified amount constitute grounds for rejection of the supply.

(6) The presence of the following chemical substances may be present in natural or treated waters, preferably not in excess of values below:

(a) Copper less than 3.0 ppm
(b) Iron and Manganese togetner less than 0.3 ppm
(c) Magnesium less than 125 ppm
(d) Zinc less than 15 ppm
(e) Chloride less than 250 ppm
(f) Sulfare less than 250 ppm
(g) Phenolic compounds less than 0.001 ppm

For chemically treated waters the phenophthalein alkalinity should not be greater than 15 ppm plus 0.4 times the total alkalinity; the normal carbonate alkalinity should not exceed 120 ppm. If excess alkalinity is produced by chemical treatment, the total alkalinity should not exceed the hardness by more than 35 ppm, as calcium carbonates.

PHYSICAL AND CHEMICAL QUALITY OF EXISTING WATER SUPPLIES:

Waters available and utilized for domestic and industrial purposes in the basin are, in general, of very good chemical quality, TABLE 9. Total solids are within the range of 30 - 450 ppm with the ground water supplies in the upper part of the range. Hardness is quite low with the exception of the ground water supplies utilized by Phoenix and Talent.

TABLE 9

CHEMICAL ANALYSIS OF WATER SUPPLIES *

Municipality Date of Sample	Total Solids (ppm)	Total Alkalinity (ppm as $CaCO_3$)	Total Hardness (ppm as $CaCO_3$)	ph	Iron (ppm)	Calcium (ppm)	Magnesium (ppm)	Sodium (ppm)	Fluoride (ppm)	Chloride (ppm)	Sulfates (ppm)	Bicarbonates (ppm)	Carbon Dioxide (ppm)
Ashland 12/3/53	30.0	30.0	24.0	7.1	0.2	8.8	0.5	5.3	0.1	3.4	1.8	30.0	5.0
Butte Falls 2/ 5/14/54	154.0	115.0	96.0	8.0	Trace	15.6	13.9	12.0	0	1.0	3.2	115.0	2.2
Cave Junction 11/4/54	95.0	62.0	65.0	6.8	0.4	10.0	10.5	1.3	0	4.3	1.9	62.0	20.0
Gold Beach 2/ 4/15/54	84.0	47.0	39.0	7.2	0.2	10.0	3.4	11.0	0.2	5.9	4.1	47.0	6.1
Gold Hill 12/3/53	66.0	36.0	36.0	6.9	0.05	7.8	4.0	6.8	0	2.1	9.9	36.0	9.0
Grants Pass 11/4/54	96.0	36.4	43.0	7.3	0.1	11.0	3.4	6.7	0	3.5	5.4	36.4	3.6
Medford 1/ 10/9/53	87.0	43.0	37.9	6.9	0.14	7.6	4.6	6.5	0.0	5.1	3.7	43.0	4.5
Phoenix 2/ 12/3/53	448.0	346.0	334.0	7.1	0.05	102.4	19	52	0.1	14.5	55.3	346.0	---
Prospect 2/ 12/4/53	34.0	32.0	25	7.3	0	1.6	5.0	4.4	0	0.2	2.0	32.0	3.0
Rogue River 2/	131	104.0	120.0	7.0	0	33.2	9.0	10.1	0	1.4	3.9	104.0	22.0
Talent 2/	290	224.0	234.0	6.7	0	71.3	13.5	21.0	0	3.5	162.0	224.0	80.0

*Data supplied by the Oregon State Board of Health

1/ Supplies water to Eagle Point, Central Point, Jacksonville and adjacent water districts

2/ Magnesium content computed

Carbonates - 0 for all above supplies

Manganese - trace in Butte Falls supply, 0 for all other supplies

Nitrates - 0.05 for Medford supply, 0 for all other supplies

Two surface supplies and one ground water supply contain a small amount of fluorides. In general, fluorides, nitrates, manganese, and iron are present in minute quantity, or not at all, and have never been of any particular importance in the Basin water supplies.

Associated with the increase in population as shown by FIGURES 4, 5, and 6 will be an increase in return flows to the surface waters of the basin from the municipal sewage treatment plants. Sewage effluents from the treatment plants and also raw sewage discharged to the surface waters may have a detrimental effect on both the chemical and the bacteriological qualities of the Basin's water supplies. Placing additional land areas under irrigation may also result in increased return flow of water to the streams of the Basin. Here again the effect of these return flows on the water quality of the Basin's water supplies is unknown. The effect of these return flows will be of primary importance to the water supplies of Gold Beach and Grants Pass.

The bacteriological sampling record of the public water supplies during the period 1954 - 1959 is presented in the APPENDIX, TABLES I through XIV. The minimum sample schedule for the water supplies during this period was one sample per month. While this schedule has not been adhered to in many cases, the results of the samples submitted indicate satisfactory bacteriological quality for the entire period.

TABLE 10 has been prepared to show the relationship of the existing water-rights, by various water uses, to the total water-rights for the Sub-Basin, and also to show the relationship of the Sub-Basin water-rights to those for the Whole Basin.

EXPLANATION OF TABLE 10

Column 1 - Lists the Sub-Basins(7) and their average annual yield (in acre-feet)

Column 2 through 11 - Lists the various water uses.
Line 1 is the existing water-rights in cfs
Line 2 is the percentage that line 1 is of the total sub-basin water-rights.
Line 3 is the percentage that line 1 is of the average annual water yield for the entire basin.

Column 12 -shows the relationship by Sub-Basin.
Line 1 is the existing water-rights
Line 2 is the percentage that line 1 is of the total, Basin water-rights.
Line 3 is the percentage that line 1 is of the average annual water yield for the entire Basin.

From this table, it may be observed that the total water-right for domestic, municipal, and industrial water usage is less than 3% of the total water-rights in the Basin and amounts to approximately 5.5% of the average annual water yield of the Basin. Use of all water-rights simultaneously, if possible, would require about 206% of the average annual water yield.

TABLE 10

WATER RIGHTS SUMMARY *

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
	WATER SUPPLY USAGE										
SUB-BASIN Average Annual Water Yield (acre-feet)	DOMESTIC *	MUNICIPAL *	INDUSTRY *	MINING *	IRRIGATION *	POWER *	FISH LIFE *	WILD-LIFE *	RECREATION *	POLLUTION ABATEMENT *	Total for Sub-Basin
Upper Rogue River 1,725,000	8.8 0.5 0.4	162.1 8.6 6.8	6.0 0.3 .2	0	461.2 24.6 19.4	1225.4 65.0 51.5	17.1 1.0 0.7	0	0	0	1,880.6 11.85 79.0
Little Butte Creek 164,000	1.3 0.06 0.6	10.0 0.5 4.3	20.1 0.9 8.7	0	2082.8 88.86 906.0	222.5 9.5 97.0	3.2 0.15 1.4	0	0.5 0.03 0.2	0	2,340.4 14.75 1,018.2
Bear Creek 112,000	4.1 0.3 2.6	29.7 2.4 19.2	6.4 0.5 4.1	33.5 2.7 21.6	1100.3 87.14 710.0	85.5 6.7 55.2	0.5 0.04 0.3	1.8 0.14 1.1	0.2 0.02 0.1	0	1,262.0 7.96 814.1
Applegate Valley 585,000	4.0 0.4 0.5	0	4.9 0.5 0.6	753.3 66.4 94.2	355.5 31.3 44.4	8.1 0.8 1.0	6.4 0.6 0.8	0	0	0	1,132.2 7.14 141.5
Middle Rogue River 801,000	9.4 0.1 0.8	125.5 1.7 11.3	12.0 0.16 1.1	2008.2 27.2 180.0	1474.5 20.13 133.0	3736.1 50.5 336.0	13.7 0.2 1.2	0	0.3 0.01 --	0	7,379.7 46.4 663.4
Illinois Valley 1,986,000	2.2 0.13 0.1	1.0 0.06 --	4.8 0.3 0.2	1048.3 61.1 38.3	645.0 37.7 23.5	7.1 0.41 0.3	4.8 0.3 0.2	0	0		1,713.2 10.8 62.6
Lower Rogue 293,000	2.7 1.5 0.7	2.5 1.4 0.6	13.0 7.5 3.2	151.3 87.0 37.3	4.0 2.25 1.0	0.5 0.29 0.1	0	0	0.1 0.6 --	0	174.1 1.1 42.9
Rogue River Basin 5,661,000	32.5 0.2 0.4	330.8 2.08 4.3	67.2 0.42 0.9	3994.6 25.2 51.7	6123.3 38.6 79.4	5285.2 33.2 68.5	45.7 0.28 0.6	1.8 0.01 --	1.1 0.01 --	0	15,882.2 205.8

* See Page 36 for explanation of table.

FUTURE WATER SUPPLY REQUIREMENTS

The importance of water in the Basin is evident by the 4,300 water-rights, totalling nearly 16,000 cfs, existing on the Rogue River and its tributaries. The distribution of these water-rights by sub-basin is shown in the preceding section - "Present Use of Basin Water Resources." These water-rights include both consumptive and non-consumptive uses as well as seasonal restrictions for the beneficial water uses shown in Table 10. Simultaneous and continuous use of the 4,300 water-rights would represent about 11,700,000 acre-feet of water annually. The State of Oregon recognizes ten beneficial uses of water for which water-rights may be obtained. The beneficial uses of water are: domestic, municipal, irrigation, power, industrial, mining, recreation, wildlife, fish life, and pollution abatement. No water-rights have been issued for the latter. Water-rights for domestic, municipal, industrial and irrigation purposes are classed as consumptive water-rights. The consumptive water-rights represent about 6,550 cfs, approximately 41% of the total, and if used simultaneously and continuously would require about 4,782,000 acre-feet annually. The average annual Rogue River discharge into the Pacific Ocean is 5,661,000 acre-feet. Although there is a sufficient volume of water available on an annual basis to meet the water needs, the problem of having the water when and where it is needed still exists.

Insufficient flows to meet existing water-rights for domestic, municipal, and irrigation requirements occur in parts of the Basin during the summer months. On some streams, water-rights amount to more than ten times the minimum flow.

Withdrawals and main-stem statutory limitations for the Rogue River are as follows:

(1) State Engineer's withdrawal effective September 6, 1915 - Withdraws all unappropriated water of the Rogue and its tributaries above Gold Ray for irrigation, power, domestic, and storage purposes.

(2) State Engineer's order effective July 27, 1934 - No further permits will be granted to appropriate the waters of Sucker and Althouse Creeks for any purpose other than domestic use, or for mining and power development where such do not consume water or interfere with existing rights.

(3) ORS 538.220 - Withdraws the waters of Mill and Barr Creeks for the protection of fish life.

(4) ORS 539.270 - Withdraws the waters of the Rogue River Main stem below Shady Cove (approximate location) for domestic, stock, irrigation and municipal purposes.

(5) ORS 538.430 - (a) Grants exclusive rights to the City of Medford for the waters of Big Butte Creek, the springs forming its headwaters, and its tributaries for municipal use. (b) Grants the right to the Eagle Point Irrigation District to use 100 cfs of Big Butte Creek water for power purposes.

(6) ORS 542.210 - Does not permit construction of dams or structures which would interfere with the free passage of fish on the Rogue below a point near Shady Cove (approximate location) and limits construction of dams between this and a point near McLeod (approximate location) to Federal agencies only.

Future water needs of the Basin will depend upon the rate of population growth and industrial development. All counties in the Basin have experienced a rapid rate of growth since 1940, as shown by TABLE 6 and FIGURE 3 for the three major counties of the Basin, and also by TABLE 7 and FIGURES 4, 5, 6 (predicted population growth for the major cities in the Basin as developed by their water resources committees). If the present Oregon Statute withdrawing the Rogue River from industrial water use is continued, the burden of supplying industrial water will fall to the municipalities. For the purpose of this report industrial water use is included with the municipal water requirements at the present rate. The exception to this is for water that would be associated with development of the pulp and paper industry for which water requirements are shown on PAGE 54. If this water must be supplied through a municipality the particular municipality's water requirements must be increased accordingly.

A continued upward trend in population and economic growth will depend upon the utilization of the natural resources. As water is one of the major factors in resource development, the Basin potential is dependent upon adequate and dependable water supplies.

MUNICIPAL SUPPLIES

The cities and their urban fringes will continue to increase in population and more water will be required to meet this expansion. The limited quantity and poor quality of ground waters will require new and expanded community type water systems using surface water supplies. There are a few localized areas, such as below Jacksonville where ground water supplies appear to be of adequate quality and quantity.

It is anticipated that the majority of the additional water supply required for future years will come from the Rogue River.

In arriving at the anticipated water requirements for the year 2010, as shown below, the following items were given consideration:

(1) Annual water requirements given in the Water Resource Committee Reports for Josephine and Jackson counties.

(2) Average daily water consumption per capita.

(3) Maximum daily water consumption per capita.

(4) That the total days of maximum consumption would be 90 per year.

(5) As cities grow, their per capita use of water usually increases by about one-tenth of the percentage increase in population.

ASHLAND:

Additional water supply may be obtained by additional developments of Ashland Canyon. The population of Ashland is expected to double by the year 2010 and on this basis the anticipated water need for the City of Ashland by that date will be 9200 acre-feet anually (SEE FIGURE 7). Development of additional storage reservoirs on Ashland Creek, above the existing municipal water intake, will permit releasing of stored waters into the creek which will in turn flow by gravity to the existing water intake for the filtration plant. Utilization of waters from the Talent Irrigation Project will require pumping a distance of approximately 7000 feet against an estimated head of 180 feet. In addition, this water will require more treatment than has been necessary for the Ashland Creek Water to produce a potable water. Future water requirements will be met by obtaining additional waters from Ashland Creek, and/or the Talent Irrigation Project.

BUTTE FALLS:

Existing supply is considered to be sufficient to meet the foreseeable future water demand.

CAVE JUNCTION:

Projection of the water usage with the predicted population to be served by the water system indicates that the existing well, at full development of 500 gpm, will be sufficient to meet the predicted water demand until the year 1983. By the year 2010, the water requirements will be about 1500 acre-feet annually (FIGURE 8). It is the opinion of the city officials that additional ground waters are readily available from the present aquifer. East Fork Illinois River could be utilized as a water-supply source; however, treatment would be necessary.

ASHLAND

WATER REQUIREMENTS
AND
PREDICTED POPULATION

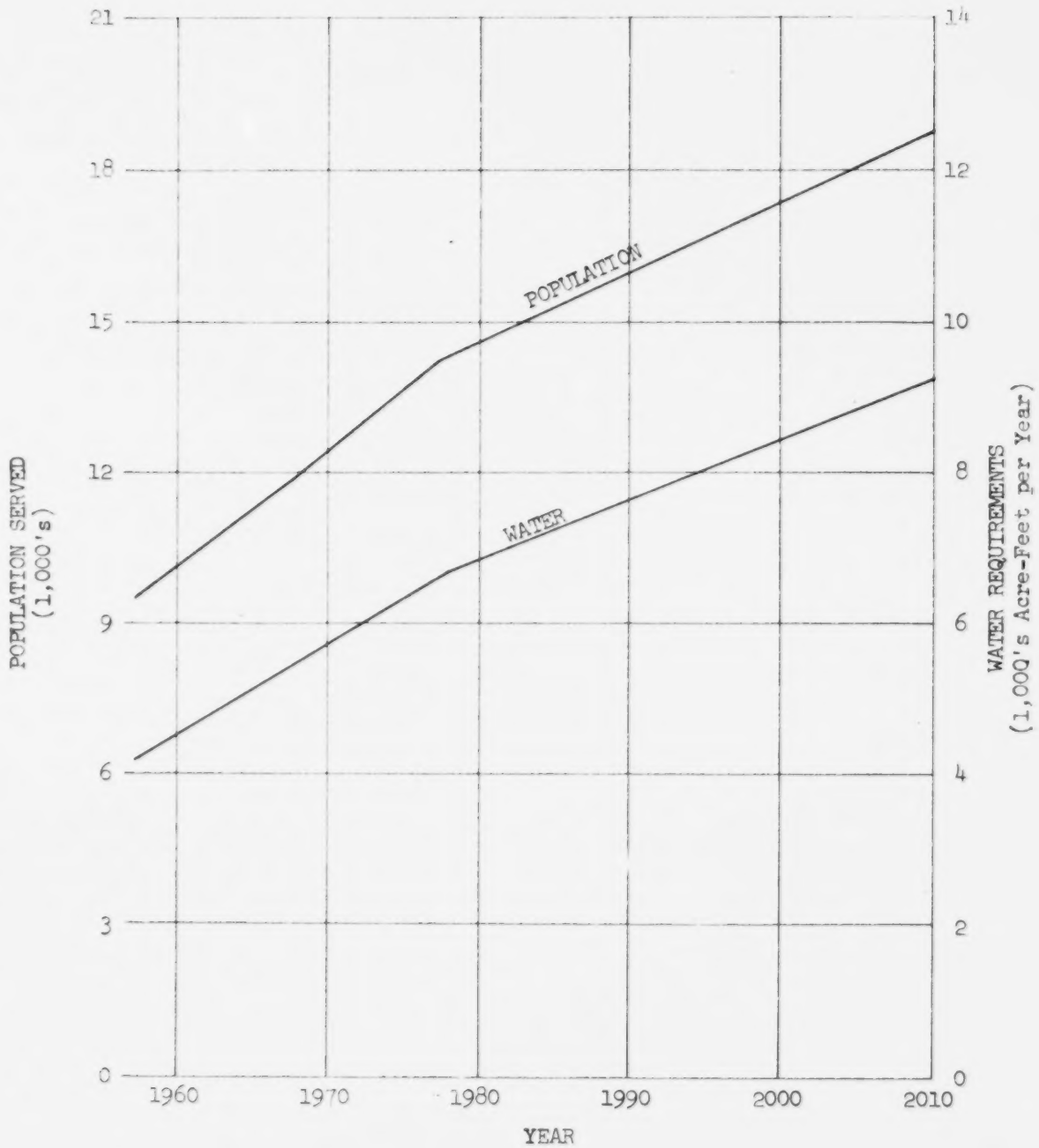


FIGURE 7

CAVE JUNCTION

WATER REQUIREMENTS
AND
PREDICTED POPULATION

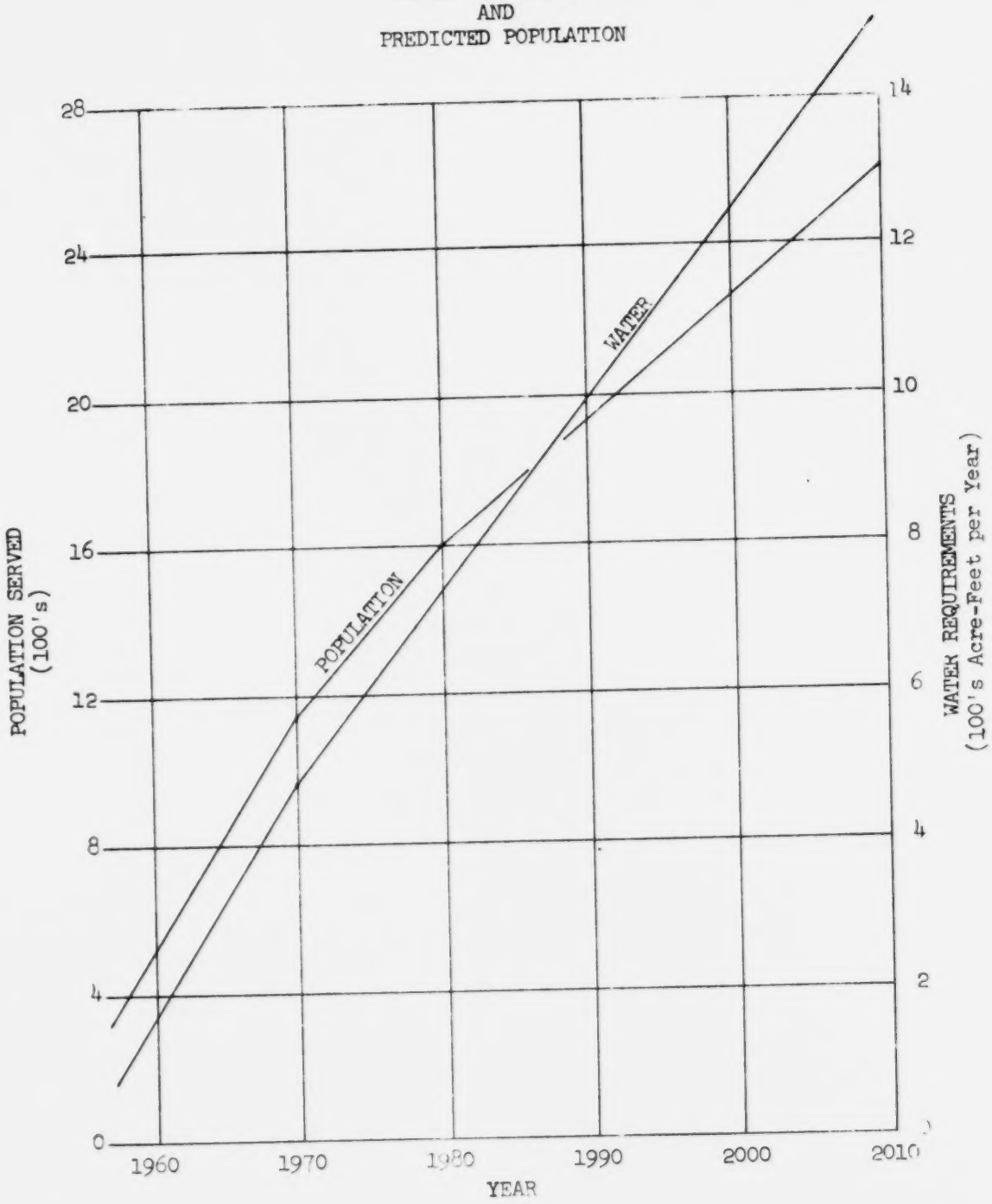


FIGURE 8

GOLD BEACH:

Utilization of the two existing water-supply sources simultaneously at the existing maximum of 245 gallons per capita per day would provide water for approximately 2200 people. It is predicted that this population will be reached in the year 1959 or early 1960. Full use of the surface water source will require adequate treatment. At present only chlorination is provided.

The present 6-inch transmission line from the well prevents full development of the ground-water supply. The City has determined from a pump manufacturer that an installation of a boaster pump on the transmission line from the well would increase the quantity of water from this source. This would be possible providing there is no hindrance caused by development of the shallow port facilities or by salt water intrusion.

Future water supply needs are predicted to be about 925 acre-feet and 1280 acre-feet by the years 1965 and 2010, respectively (FIGURE 9). With a maximum dependable draft from the two water-supply sources of 540,000 gpd, the present installed facilities would meet conditions until about the year 1962. With the existing water-right on Indian Creek and the well, assuming water is available, the City has available about 1760 acre-feet of water annually. However, it is reported by the city officials that the flow in Indian Creek is not sufficient to meet their water-right during the summer months.

GOLD HILL:

Future water supply needs are predicted to be approximately 555 acre-feet annually by the year 2010 (FIGURE 10). This is based upon the maximum daily per capita use being 150% of the average daily per capita use. However, the lack of metering facilities must be remembered. City officials have reported the maximum month water use as 35 mg during months of July and August. No figure is available pertaining to the quantity of water that may be obtained, but if it can be assumed that a sufficient quantity is available to meet the maximum month demands stated above, there is more than an adequate quantity available to meet future predicted needs if storage facilities are utilized during periods of maximum demand. Future water supplies will be obtained from the Rogue River at the existing water intake. It is also concluded that chemical coagulation and filtration will be necessary.

GRANTS PASS:

Based on a current maximum of 540 gallons per capita per day, a minimum flow of 8.5 cfs is necessary to serve 10,000 people. Projection of this figure with the predicted population to be served in the year 2010 by the municipal water system indicates that the water needs will be 23,400 acre-feet annually. With the projection of the average

GOLD BEACH

WATER REQUIREMENTS
AND
PREDICTED POPULATION

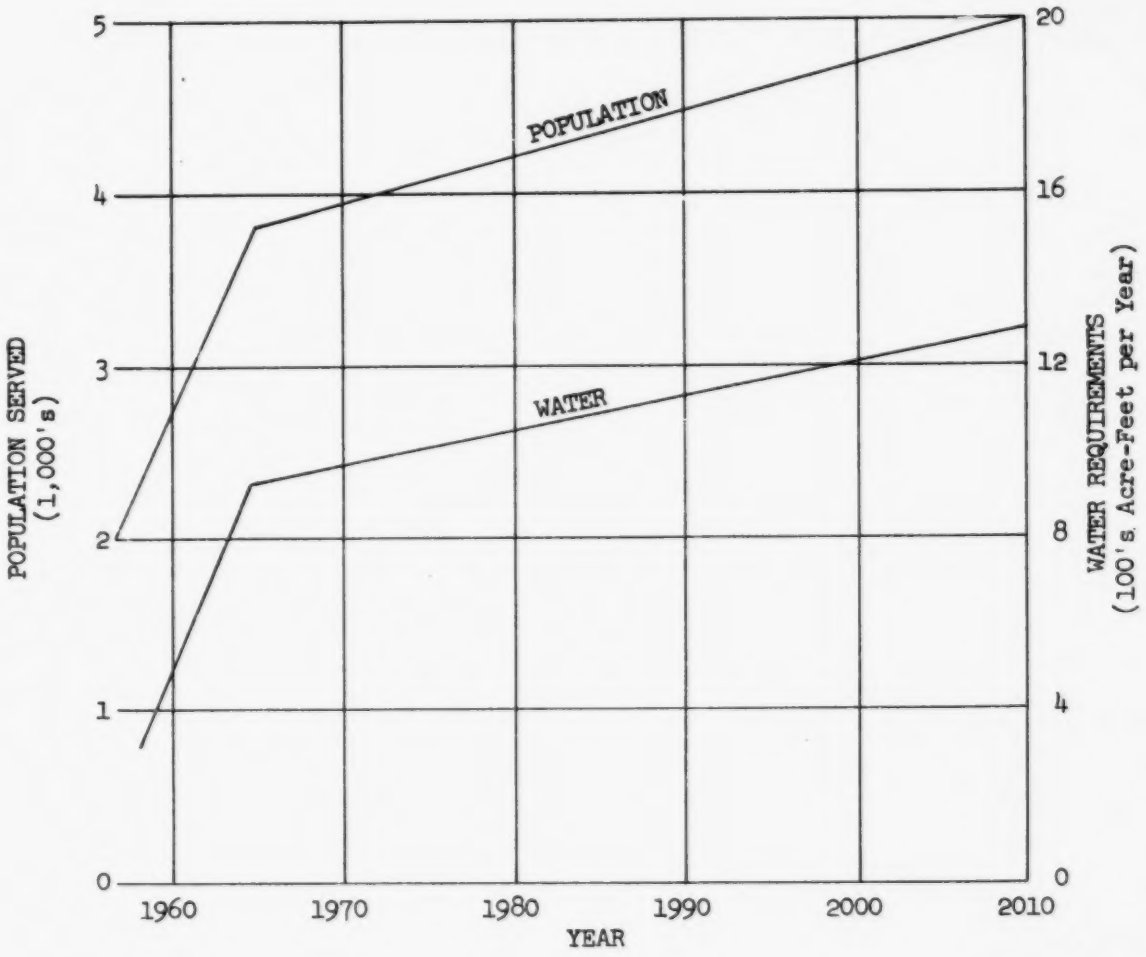


FIGURE 9

GOLD HILL

WATER REQUIREMENTS
AND
PREDICTED POPULATION

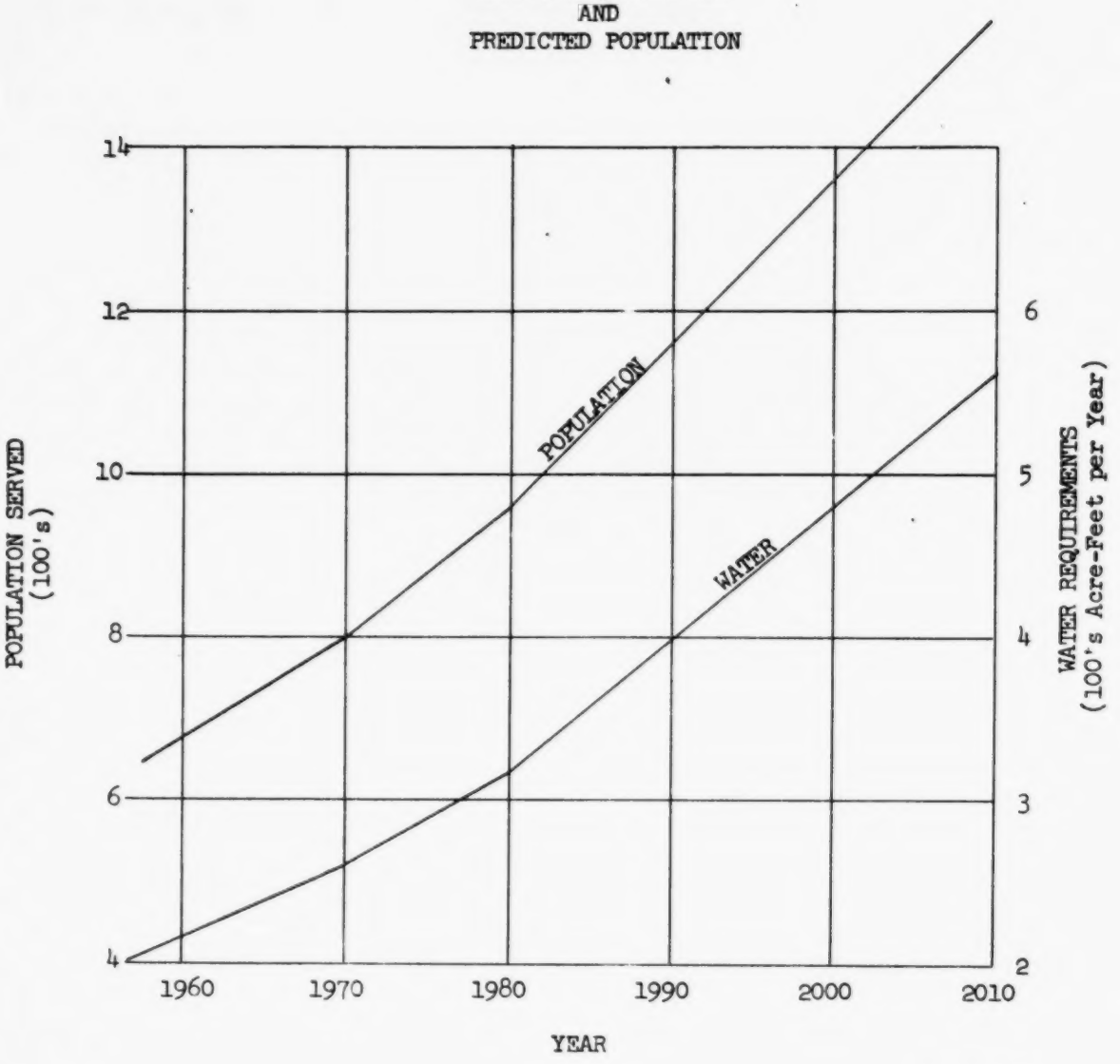


FIGURE 10

daily per capita water consumption to year 2010, the total water requirements will be 15,400 acre-feet annually (FIGURE 11). The present water-rights of 8700 acre-feet will meet the water demand until 1982. These figures include industrial water usage at the present rate. Waters released from upstream storage reservoirs would be pumped from the Rogue River at the existing city water intake.

JACKSONVILLE:

Future water needs are included with those for the City of Medford.

MEDFORD:

Future water requirements for the City of Medford include the water requirements for the following:

(1) City of Medford
(2) Suburban area immediately surrounding Medford and along the route of the Big Butte Springs transmission lines.
(3) Charlotte Ann Water District.
(4) Meyers Lane Water District.
(5) Kings Highway Water District.
(6) Jacksonville Highway Water District.
(7) Maple Park Highway Water District.
(8) Elk City Highway Water District.
(9) Midway Water District.
(10) Town of Eagle Point.
(11) City of Jacksonville.
(12) City of Central Point.
(13) Camp White area (White City Realty Co.).

The predicted future population to be served by the Medford municipal water system by the year 2010 is 97,000. Projection of the present water use to the year 2010 on the basis outlined at the beginning of this section indicates that the municipal water supply needs will be 33,600 acre-feet annually (FIGURE 12). Present-day demands average about 9,400 acre-feet annually. The above figures are based upon the assumption that normal industrial requirements will be at the present rate and that adequate storage facilities are utilized to satisfy the maximum demand periods.

Flow from the existing Big Butte Springs serving the Medford Municipal system is equivalent to about 28,000 acre-feet annually. The city presently holds water-rights on the Rogue River equivalent to about 71,600 acre-feet annually. Utilization of the Rogue River at River Mile 132 will necessitate pumping all water to the city and will require a water purification plant.

GRANTS PASS

WATER REQUIREMENTS
AND
PREDICTED POPULATION

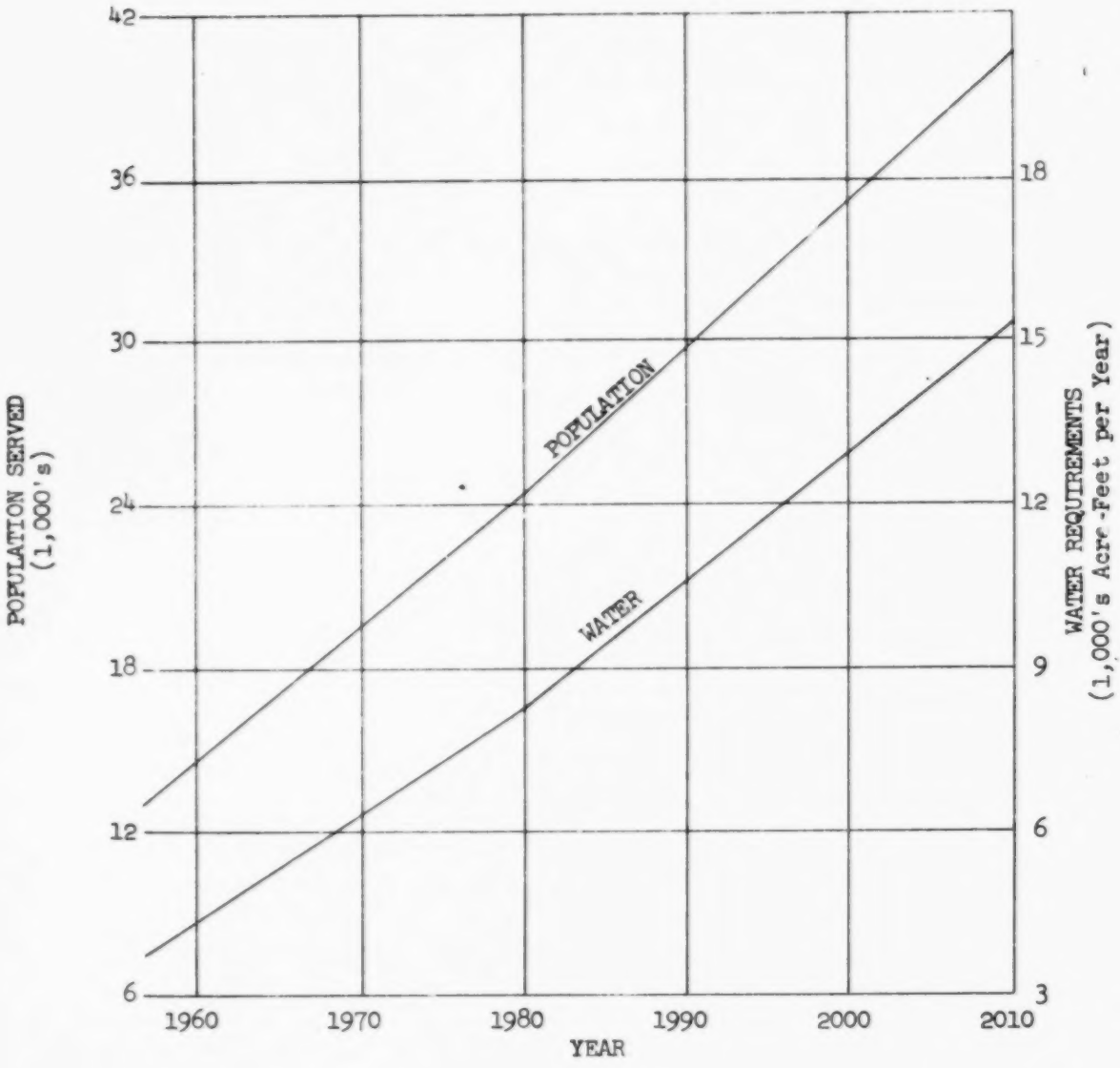


FIGURE 11

MEDFORD

WATER REQUIREMENTS
AND
PREDICTED POPULATION

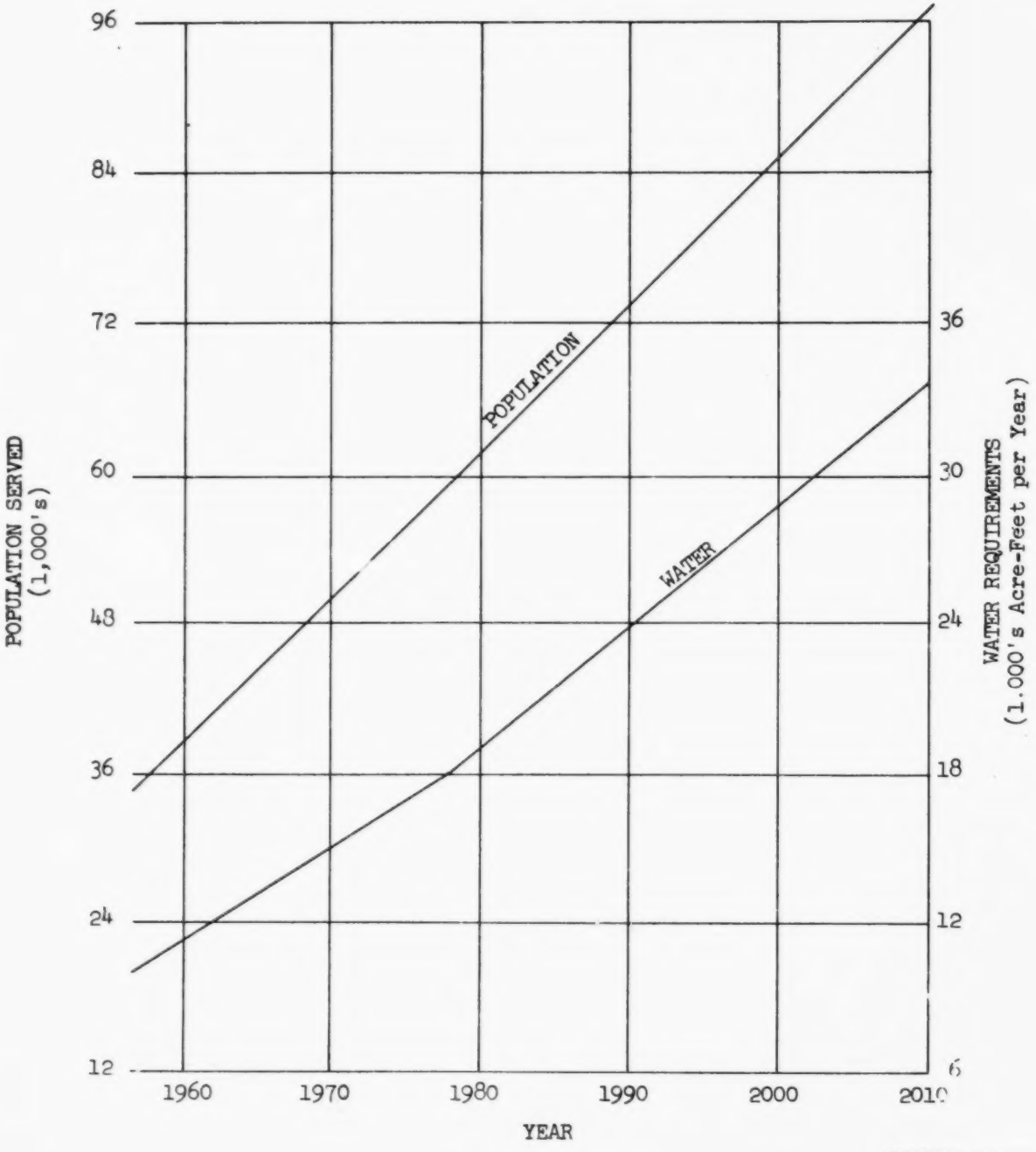


FIGURE 12

PHOENIX:

The existing ground water supply utilized by the city has a capacity equivalent to 690 acre-feet per year. By extending the daily per capita water use to the predicted population for the year 2010, the future water requirements are found to be 1280 acre-feet annually (FIGURE 13). The existing water supply used at the present per capita daily rate would be sufficient until 1958. New wells will be constructed to meet increased water demands.

PROSPECT:

Existing water supply is considered adequate to meet foreseeable future water demands.

ROGUE RIVER:

Construction of a new well to replace an existing well that must be abandoned due to highway construction will meet the foreseeable water requirements.

TALENT:

The existing ground-water supply is equivalent to about 130 acre-feet annually. Projection of the daily per capita consumption ranging from 120-195 gallons to the year 2010 for a predicted population of 3650 people indicates that the water requirements will be about 940 acre-feet annually (FIGURE 14). Water to meet future requirements will probably be obtained from the Talent Irrigation Project in exchange for water from Wagner Creek.

PHOENIX

WATER REQUIREMENTS
AND
PREDICTED POPULATION

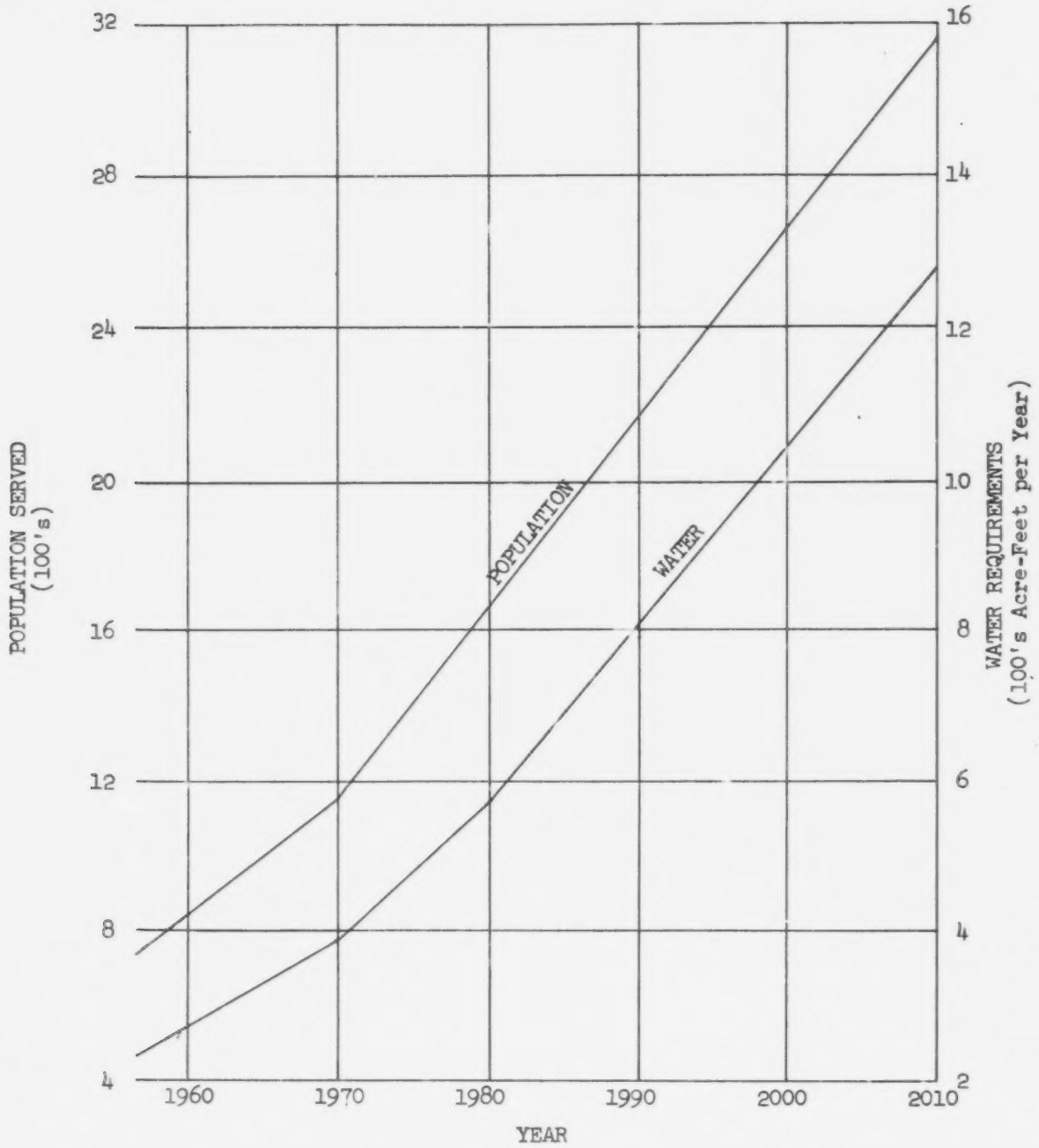


FIGURE 13

TALENT

WATER REQUIREMENTS
AND
PREDICTED POPULATION

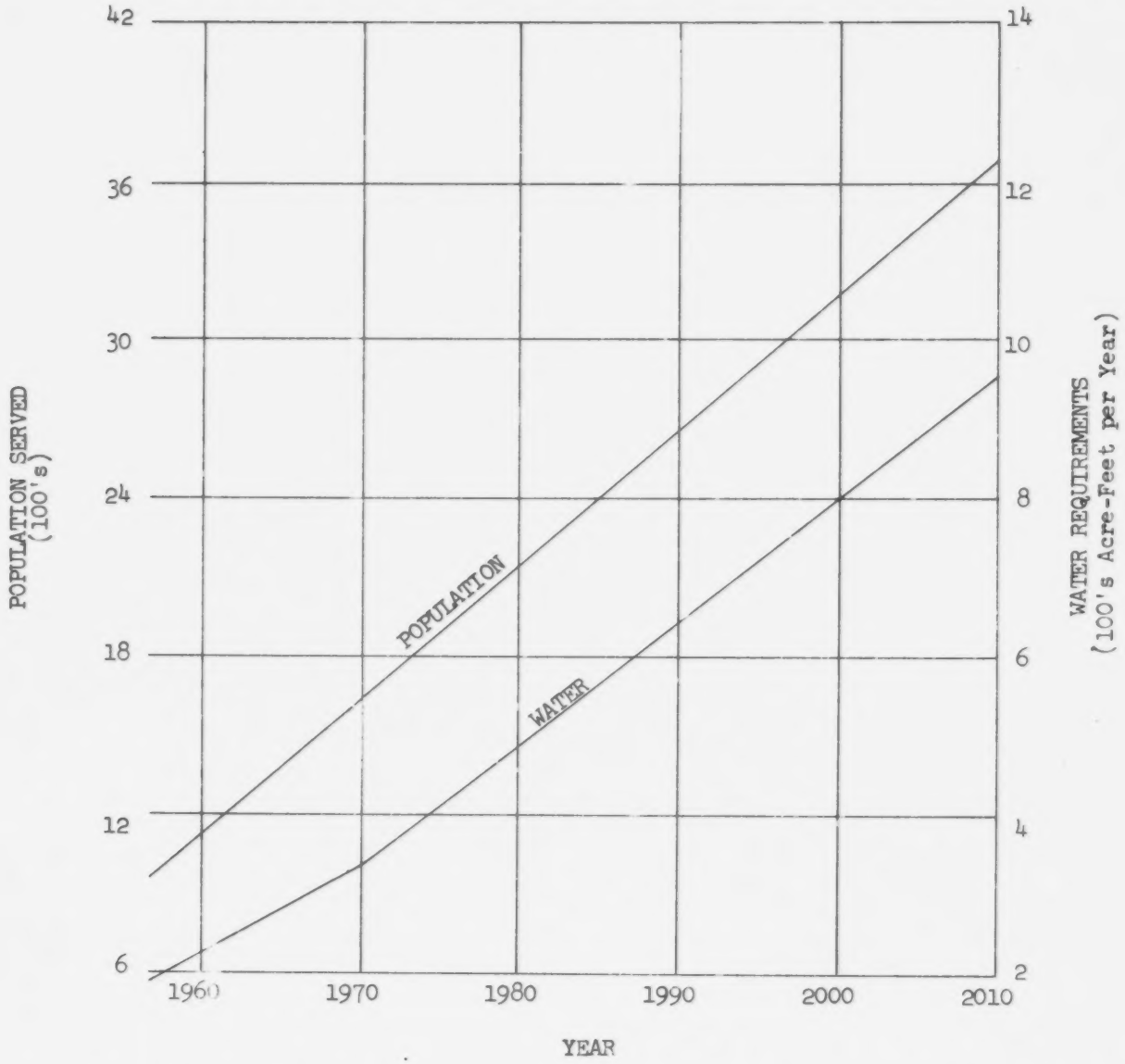


FIGURE 14

TABLE 11

SUMMARY TABLE FOR WATER REQUIREMENTS
ACRE-FEET PER YEAR *

CITY	EXISTING SUPPLY OR WATER RIGHTS	TOTAL FUTURE REQUIREMENTS 2010	NET WATER FROM FUTURE STORAGE RESERVOIR
Ashland	6,700	9,200	2,500
Butte Falls	640	640	0
Cave Junction	810	1,500	1/
Central Point	2/	2/	2/
Eagle Point	2/	2/	2/
Gold Beach	1,760	1,280	4/
Gold Hill	2,170	555	0
Grants Pass	8,700	15,400	6,700
Jacksonville	2/	2/	2/
Medford 5/	28,000	33,600	5,600
Phoenix	690	1,280	1/
Prospect	3/	3/	3/
Rogue River	3/	3/	1/
Talent	130	940	810 6/
TOTAL	50,850	64,395	15,610

* Excludes industrial water use above the present rate.

1/ Ground water to be developed for future supply
2/ Included with City of Medford
3/ Data not available
4/ Assuming Indian Creek flow sufficient for present water-right
5/ Also hold 100 cfs (71,600 acre feet/year) rights on Rogue River
6/ Exchange of water rights proposed.

TABLE 12

MUNICIPAL WATER SUPPLY DATA

CITY	POPULATION			SOURCE OF WATER SUPPLY	FLOW AVAILABLE OR AUTHORIZED (cfs)	FUTURE	
	FEDERAL CENSUS 1950	STATE CERTIFIED 1958	SERVED ESTIMATED 2010			REQUIREMENT	SOURCE
Ashland	7,739	8,800	18,800	Ashland Creek	9.25	9,200	Ashland Creek and Talent Irrig. Dist.
Butte Falls	372	360	--	Ginger Cr. Springs West Fk.	0.89	--	Ginger Creek East Fk.
Cave Junction	283	300	2,600	Ground Water	1.2	1,500	Ground Water
Central Point	1,909	2,100	20,000	3/	3/	3/	3/
Eagle Point	607	690	2,770	3/	3/	3/	3/
Gold Beach	677	1,950	5,000	Indian Creek and Ground Water	2.5	1,280	Ground Water or Surf. Supp.
Gold Hill	619	650	1,550	Rogue River	3	555	Rogue River
Grants Pass	8,116	9,900	40,500	Rogue River	12	15,400	Rogue River
Jackson-ville	1,193	1,160	3,143	3/	3/	3/	3/
Medford 1/	19,050	24,300	97,000	Big Butte Springs	37.5	33,600	Rogue River 2/
Phoenix	746	730	3,130	Ground Waters	0.60	1,280	Ground Water or 3/
Prospect	500	--	--	Mill Creek	--	--	Rogue River
Rogue River	590	600	--	Ground Water	--	--	Rogue River
Talent	739	930	3,650	Ground Water	0.33	940	Talent Irrig. Project

1/ Medford system supplies Central Point, Eagle Point, Jacksonville, 7 water Dist. & White Realty Co. (Camp White Area)

2/ City of Medford has water-rights for 100 cfs at River Mile 132

3/ Included in City of Medford data

INDUSTRIAL SUPPLIES:

The mineral resources of the Basin are not sufficiently well known to accurately project the industrial growth and the water needs that may result from their utilization. On the basis of available data, the Oregon State Water Resources Board estimates that the water needs for mineral industries will not exceed 15 to 20 cfs (10,850-14,000 acre-feet annually).

The municipal water needs discussed previously are based upon the assumption that normal industrial requirements supplied from the municipal water system will be at the same ratio as present. Present industrial use is estimated at 15% of the total municipal use. If the present Oregon statute withdrawing the Rogue River from industrial water use is continued, the burden of supplying industry will fall to the municipalities.

The major potential industrial water users are the pulp and paper industries. In their Rogue River Valley Pulp and Paper Development Study, dated March 31, 1958, for the Oregon Development Commission, Sandwell & Company presented their findings of a survey of pulpwood resources in the Rogue River Valley and the possibilities of developing a pulp and paper industry in the Basin to utilize these resources.

Their conclusions are:

(1) Sufficient suitable raw materials from sawmill and veneer plant residues are available in the Rogue River Valley Study area to support a new kraft paper and pulp mill of an initial capacity of 300 tons per day, although long-range expansion might depend upon raw materials from outside the study area.

(2) The nature of the raw materials and consideration of other factors, such as effluent disposal preclude the consideration of products other than those preduced by the kraft process.

(3) General consideration of market trends indicates that unbleached kraft papers and liner board are the most favorable products.

(4) The study region has suitable sites in both the Grants Pass and Medford areas on which to locate a kraft pulp and paper development. However, air pollution problems make impractical the consideration of the Medford area as a prospective mill site. The problem of plant location is further aggravated by existing State laws that prohibit the use of the Rogue River for effluent disposal and water supply.

(5) An attractive return on the invested capital could be realized at present market prices and present production and construction costs.

Water requirements for the proposed mill would be approximately 15 cfs initially (10,800 acre-feet per year), and possibly 30 to 50 cfs (21,700 - 36,200 acre-feet per year) in the future. It has been estimated that the potential use of water for non-chemical fibre would not exceed 10 cfs (7,240 acre-feet per year).

Under present stream regulation policies, the only dependable source of water supply is the main stem of the Rogue River. Existing restrictions on the use of main stem water make it essential that storage facilities be developed to provide water to meet the demand that may develop for industrial water supplies.

ANALYSIS OF POTENTIAL WATER DEVELOPMENT PLANS

The predicted over-all annual water supply requirements for the Basin's municipal and industrial water users by the year 2010 are:

Municipal	64,395 acre-feet
Mineral Industry	10,850 - 14,000 acre-feet
Pulp and Paper Industry	10,800 - 36,200 acre-feet
Non-Chemical Fibre	7,240 acre-feet

Industrial water requirements used are those determined by the Oregon State Water Resources Board. A summation of the Basin's municipal annual water requirements shown in FIGURE 7 through 14 indicates that the future water needs increase by approximately 9000 acre-feet per decade. This straight-line relationship will be influenced by the rate of industrial development in the Basin. Assuming full development of existing water supplies, the amount of supplemental water necessary to meet the predicted water requirements of 2010 will be:

Municipal	15,610 acre-feet
Industrial(Total)	28,890 - 67,440 acre-feet

By reference to the map of the Rogue River Basin on page 1 it is apparent that no one water supply can economically be developed to serve the entire Basin's water requirements. Furthermore, the location of the proposed reservoirs is such that not all of the municipalities could receive direct benefits from their construction. Two cities, Ashland and Talent, would not be in position to utilize any water stored in the proposed reservoirs without the installation of pumping facilities and long transmission lines. The cost associated with this would be very high compared to that for developing of other water sources that are available to them. Excluding these two cities, the quantity of water required from the Rogue River development to meet the future water requirements will be:

Municipal	12,300 acre-feet annually
Industrial(Total)	28,890 - 67,440 acre-feet annually.

The cost of developing additional water supplies to meet requirements of year 2010 has been computed for each community from data obtained from the respective officials. These costs may be shown as initial cost per acre-foot, total annual expense, or cost per year per acre-foot.

(a) Initial cost per acre-foot is that cost which would be obtained if all capital costs were met immediately.

(b) Annual expense includes interest, depreciation, and operation costs.

MUNICIPAL WATER:

ASHLAND: Additional water supplies may be obtained from two sources, both of which are surface supplies. Additional development on Ashland Creek is estimated to provide approximately 1850 acre-feet annually. This volume of water would become available upon the construction of three small storage reservoirs in Ashland Canyon at an estimated total cost of $2,700,000. Water thus stored would be released into the stream for transmission to the city's existing water intake. It is estimated that the aggregate water supply would then be sufficient to meet the water demand until about the year 2000, and that the water filtration plant will be operating at design capacity. The initial cost per acre-foot by developing all three reservoirs immediately would be $1,460. The annual expense for development of this additional 1850 acre-feet will be about $130,000 ($70/acre-feet) using 50 years as the economical life of the project. However, development of the additional reservoirs could be done in stages and not all at one time. The initial cost per acre-foot of additional water made available by stage construction of the three reservoirs would be $1,250, $1,560, and $1,670, based on today's estimated construction cost. The annual cost of these reservoirs would be $48,500 ($60/acre-foot), $48,500 ($80/acre-foot), $33,000 ($75/acre-foot), respectively.

The second source of surface water to be considered is that obtained from the Talent Irrigation Project (TID). Water from the storage reservoirs would be transported by gravity flow in an existing irrigation water channel into the city. This water then must be pumped either before treatment or after treatment. For the purpose of this report, the water is pumped against a 180 foot head, through 7000 feet of line to the existing water treatment plant. If Ashland Canyon is developed first, then the TID water would not be needed until year 2000, when raw water would be purchased from the TID. Also, at this time additional water treatment facilities will be required. To meet the municipal water requirements for the year 2010, as shown in TABLE 11 of the preceeding section, there will be 8550 acre-feet obtained from the Ashland Canyon development and 650 acre-feet of water obtained from the TID. The estimated annual expense for the TID water, using present

estimated costs, will be $13,000 ($20/acre-foot) plus cost of TID water beginning year 2000. The initial cost is estimated at $190/acre-foot. These figures would vary depending upon the amount of water purchased from the TID.

Elimination of further development in Ashland Canyon and purchasing of raw water from the TID to meet the future water requirements is also a possibility. This plan would entail purchase of 2500 acre-feet of water from TID by the year 2010. Under this plan 1850 acre-feet of additional water per year would be necessary to satisfy the demand until year 2000 at an initial cost of $35/acre-foot or an annual expense of about $13,000 ($7/acre-foot), plus cost of an additional 650 acre-feet per year from 2000 to 2010 would make the total annual expense for the last 10 year period about $30,000, plus the cost of TID water. Additional treatment facilities would be necessary beginning in the year 2000.

BUTTE FALLS:

Insufficient data available, existing supply assumed adequate.

CAVE JUNCTION:

Approximately 690 acre-feet, primarily additional water, is estimated as the water requirement by the year 2010. It is reported that the aquifer from which the existing water supply is obtained is sufficient to allow further development to meet this requirement. To obtain the 690 acre-feet of additional water requires the construction of an additional well to yield about 430 gpm. Providing the aquifer is as reported, another well may be readily constructed. To place this water in the distribution system, the total costs are estimated to be about $20,000 ($29/acre-foot).

The East Fork of the Illinois River could also be utilized as a water supply should it be necessary to utilize surface water. Before a potable water supply could be produced, it would be necessary to construct a water filtration plant. Assuming that the existing water source is depleted and the town must report to a surface water supply the estimated annual cost to supply the water demand of 1500 acre-feet per year is $12,000 ($8/acre-foot) over a 50-year period. Initial cost per acre-foot would be about $70.

CENTRAL POINT:

Included with the City of Medford.

EAGLE POINT:

Included with the City of Medford.

GOLD HILL:

Existing water-rights on the Rogue River are abour 4 times greater than the estimated water requirements for the year 2010. No additional water supplies will be necessary; however, construction of water treatment facilities should be accomplished.

GOLD BEACH:

From analysis of the data presented in the preceding section, the existing water-rights are sufficient to meet the foreseeable water requirements for the year 2010. However, it is reported that the flow in Indian Creek during the summer months in insufficient to meet the 2 cfs water-right. In view of this, the city has endeavored to obtain information pertaining to development of additional water supplies. Information received by the city from well construction companies indicate that a 1-mgd well could be obtained for about $55,000 ($49/acre-foot) and a 3-mgd well for $90,000 ($27/acre-foot). These costs are for the well only. The wells would be constructed near the Rogue River and would utilize the filtering characteristics of the gravel and sand formations.

If additional surface water supplies are to be developed, the most logical source would be the Rogue River. Tide water extends approximately 5 miles up the Rogue River so any water intake must be above this point. As no water treatment facilities are presently available, the development of the Rogue would involve (a) river intake structure, (b) treatment facilities, and (c) transmission lines. It is obvious that utilization of the Rogue River would cost considerably more than development of additional ground-waters as outlined above.

GRANTS PASS:

Three water sources may be considered for development of adequate supplies to meet the predicted municipal water requirements of 15,400 acre-feet in the year 2010. They are: ground waters, Jumpoff Joe Creek, and the Rogue River.

It is reported that the ground-water supply in the area is not available in adequate quantity to meet the municipal demand and also that the ground water quality is generally considered unsatisfactory. There are a few private artesian wells just north of the city. However, no specific data are available. Investigation of this source has received some cursory consideration by the City Council. Because extensive engineering investigation, as well as construction of wells and pumping station accompany development of this source, it is estimated that the cost of water from the artesian aquifer would be very high.

Development of the potential surface water source in Jump-off Joe Creek, providing that adequate storage facilities exist on the creek to satisfy all water-rights, would also be high. To get this water into the municipal water system, it would be necessary to construct about 15 miles of transmission line and pump all water over the mountain or tunnel through the mountain. Adequate water treatment facilities would also be necessary. The water quality of Jumpoff

Joe Creek would be comparable to that of the Rogue River, and as the latter flows through the city it would not appear economically sound to develop Jumpoff Joe Creek if sufficient flow to satisfy all water-rights can be maintained in the Rogue River.

The Rogue River is presently utilized as the source of the municipal water supply. Construction of storage reservoirs on the Rogue River above Grants Pass would be the most economical means of meeting future water requirements. Such construction would eliminate the need of transmission mains, as the water would flow in the river to the existing city water intake. The costs for further development of this source would consist of (a) increased pumping capacity at the intake, (b) increased treatment plant capacity, and (c) storage facilities or purchase of water from storage facilities. The predicted population and water requirements shown in FIGURE 11 indicate that additional water supplies would not be necessary until about 1982. With the construction of treatment facilities and appurtances at this time the estimated annual expense, based upon 1958 dollars, is $92,900 ($14/acre-foot), plus the cost of developing storage facilities that may become necessary.

JACKSONVILLE:

Included with the City of Medford.

MEDFORD:

There are four potential sources of water that could be developed to meet the predicted water requirement of the year 2010. These are:

(1) Additional development in the Big Butte Springs area.

(2) South Fork of the Rogue River northeast of the Big Butte Springs area.

(3) Rogue River diversions to the city through irrigation canal.

(4) Rogue River at Camp White

It is estimated that additional development of the Big Butte Springs area would yield about 6 mgd. Development expenditures necessary to obtain this water would include (a) increasing the capacity of the existing transmission line by construction of approximately five miles of new lines to parallel the existing line and bring the carrying capacity of the transmission line to that of an equivalent diameter throughout the entire length of 30.5 miles, (b) additions to the existing collector pipe network at the source (c) construction of a small pumping station, and (d) provision of 2,600 acre-feet of storage to satisfy other water-rights.

From the foregoing items it is readily apparent that the cost for such development would be exceedingly high in relation to the quantity of water than would be realized.

Water for future needs may possibly be obtained from the South Fork of the Rogue River at a point northeast of the Big Butte Springs area. However, stream flow records are not available to ascertain the quantity of water that would be available from this source during a dry year. Development of this source would divert water from existing downstream power plants and would also require construction of approximately 35 miles of transmission line. Development of this source does not lend itself to stage development as the water demand rises. The water quality would be nearly equal to that of the present supply obtained from the Big Butte Springs and a gravity transmission line to the city could be utilized. Water purification facilities would probably be necessary with this source.

Assuming that adequate flows exist in the river to meet the future water requirements, the annual expense is estimated at $185,000 ($33/acre-foot) over a 25-year period. The initial cost per acre-foot is $390.

With the construction of a dam on the Rogue River approximately two miles above the town of Trail, in conjunction with new and larger irrigation canals, it would be possible to take water from the irrigation canal at Medford and thus eliminate a pumping problem as well as a long transmission line. This supply would require water purification facilities. The costs of water treatment and the water quality may also be affected by irrigation return flows entering the canal.

Excluding the cost of constructing the storage facilities, the annual expense is estimated at $110,000 ($19/acre-foot) over a 25 - year period.

The fourth additional source of water is the Rogue River at Camp White. This source is the one selected as the most logical by the Jackson County Water Resources Committee and by the city. The advantages of this source are (a) the city presently holds a permit for 100 cfs at this location, (b) the supply lends itself to development by stages as the water demand rises, (c) relatively low capital investment, (d) adequate water available during dry years based upon past stream flow records, (e) initial development could be sufficient to supply the water demand of the Camp White area. Thus leaving more water from the present source to meet the water demand in other areas served by the municipal system, (f) possible utilization of existing transmission line for water pumped to the city until future demands warrant additional construction. The disadvantages of this water supply are: (a)

high operating cost as all water to the city must be pumped against a head of approximately 400 feet, (b) construction of a complete water purification plant is necessary, (c) opinions have been expressed that the water quality would not be equal to that of the existing water supply.

Assuming adequate river flows are available the estimated initial cost of developing this source is $840,000 ($150/acre-foot) with the annual expense, over a 25 year period estimated to be $113,000 ($20/acre-foot).

All of the annual expense estimates given above exclude the industrial water use requirements shown in the preceding section (page 54). Also adequate distribution storage is assumed to meet the maximum water requirements.

PHOENIX:

Three potential water sources may be developed to meet the future water requirements of 590 acre-feet per year. They are: ground water supplies, Bear Creek, and the Medford municipal water system.

City officials report that additional water may be obtained by construction of wells in the vicinity of the present city wells. Assuming adequate ground waters are available, three wells having a yield equivalent to the two existing wells would be necessary. The total expense to develop this source is estimated to be about $45,000 ($76/acre-foot). Development of additional wells would parallel the water demand.

Development of a surface water supply utilizing Bear Creek must include water filtration facilities and is dependent upon adequate stream flows. The estimated initial cost per acre foot is $175 and the annual expense over a 25-year period to develop this source is $15,000 ($25/acre-foot). However, Bear Creek receives the effluent from two sewage treatment plants immediately upstream from Phoenix, this would tend to eliminate the use of Bear Creek as a municipal water supply source.

The Medford municipal water system is available at the Phoenix city limits. Cost of an interconnection between the two water systems is estimated at $40,000. Individual water costs would increase; however, the elimination of the need for individual home water softeners would off-set the increase in the individual water rates.

PROSPECT:

Insufficient data available - existing supply assumed adequate.

ROGUE RIVER:

Insufficient data available - existing supply assumed adequate.

TALENT:

Development of additional ground water supplies to meet the future water requirements is not considered economical as the number of wells necessary, based on the yield of existing wells, would be high. It is estimated that 10 additional wells, at an average cost of $4,000 each, would be necessary to meet the predicted water requirement, assuming that the ground water supply is adequate.

Utilization of water from the Talent Irrigation District has been under consideration by the city officials. It is proposed to exchange water-rights on Wagner Creek for TID water. Development of this source of water will require water filtration facilities; however, a finished water much reduced in hardness over the present ground water supplies will result. The estimated initial cost is $132/acre-foot and the annual expense to develop this source is $15,000 ($19/acre-foot).

TABLE 13 shows the estimated cost, where available, of obtaining supplemental municipal water supplies. The cost per acre-foot is that associated with obtaining a source of water supply and does not reflect operating cost or the costs incurred by the construction of water purification facilities.

TABLE 13

CITY	ADDITIONAL WATER SUPPLY		COST PER ACRE-FOOT	
	ACRE-FOOT	SOURCE	INITIAL	ANNUAL
Ashland	800	Ashland Canyon	$1250	$60
	600	Ashland Canyon	1560	80
	450	Ashland Canyon	1670	75
	650	Talent Irrigation Dist.	65 1/	8 1/
	1850	Talent Irrigation Dist.	2/ 30 1/	2 1/
Cave Junction	690	Ground Water	29	2
	690	Illinois River	3/	3/
Gold Beach	1120	Ground Water	49	2
	3360	Ground Water	27	1
Grants Pass	6700	Rogue River	3/	3/
Medford	5600	S. Fork Rogue River	330 3/	25 3/
	5600	Rogue River, Irrigation Canal	60 3/	3 3/
	5600	Rogue River, Camp White	3/	3/
Phoenix	590	Ground Water	76	3
	590	Bear Creek	3/	3/
	590	Medford Water System	68	3
Talent	810	Ground Water	50	2
	810	Talent Irrigation Dist.	9 1/	1 1/

1/ Plus cost of purchasing TID water
2/ Omitting additional development of Ashland Canyon
3/ Costs associated with storage not available.

INDUSTRIAL WATER:

Under present stream regulation policies, the only dependable source of water supply is the main stem of the Rogue River. Restrictions on use of the main stem waters requires the development of storage facilities to meet the industrial water demand or municipalities must provide the required industrial water through the municipal water system.

The most favorable industrial sites are located in the Middle Rogue and Bear Creek Sub-Basin, Grants Pass - Medford area. In these areas the terrain is suitable for industrial plant sites, utilities are considered more adequate than in other areas, and the proximity to labor markets is advantageous.

It is impossible to predict the specific location of future industrial plants and consequently the industrial water needs should be considered on an area basis at this time. Industrial water for the entire area could be supplied from either of the proposed Lake-Creek, Elk Creek, or Lost Creek reservoirs, or by a combination of these three reservoirs.

The proposed Meadows project on Evans Creek will primarily benefit the Grants Pass area.

ALTERNATE WATER SUPPLY:

To determine the annual benefits resulting from an increase in water quality and dependability by the construction of the proposed projects on the Rogue River and its tributaries, an alternate water source on McNeil Creek, tributary of Big Butte Creek, was selected. Development of this source is believed to be the cheapest alternative water source available to develop and it is also located in the same general vicinity as the proposed Federal projects. As with the proposed Federal projects, development of this alternative source would eliminate construction of separate water transmission facilities, as released waters will be transmitted downstream in the regular stream channel to the areas requiring augmented water supplies.

Studies made by the Portland District, Corps of Engineers, indicate a site on McNeil Creek as the most logical for development as an alternative source of water supply. The site is located in Section 23, T. 34S., R. 1E., W.M. A dam to create a reservoir with 20,000 acre-feet of usable storage space, over and above the amount which would be required for release to control temperatures in the interest of fish life in the Rogue, would be about 138 feet in height above the stream level. Runoff from the approximately 25 square-mile area of McNeil Creek upstream from the site would not be adequate to insure filling of the reservoir in low-water years. To assure filling at all times, flows could be diverted from Big Butte Creek during the winter months by the construction of a diversion structure and about 2 miles of canal of 125 cfs capacity.

Estimated total cost of such a project would be about $6.5 million, or about $325 per acre-foot of usable storage space. Total annual charges for development of this alternative water supply would be about $300,000, or about $15 per acre-foot of usable storage per year.

The potential water demand, over and above present usage, is estimated at 41,190 to 79,740 acre-feet per year as of the year 2010. The average rate of increase is estimated on a straight line basis but will be primarily influenced by the rate of industrial development which will depend in turn upon availability of adequate water supplies.

A storage reservoir having a usable storage space of 20,000 acre-feet would satisfy about 25% of the total anticipated water demand for the year 2010. If demands increase on a straight line basis from the year 1960, that amount of storage could be expected to be substantially under contract by the end of a 10-year interest-free period beginning at the earliest practicable date for project completion. Therefore, in arriving at the size of this reservoir, the following factors were considered:

(1) The rate at which municipal water requirements may be expected to increase.

(2) Inability to accurately predict the time that industrial developments may occur.

(3) Holding to a minimum interest costs that may begin to accrue following a 10-year interest-free period during which water may not be utilized.

Additional storage sites in the Big Butte Creek Watershed and elsewhere in the Upper Rogue area would remain available for future storage development to satisfy the fully estimated water supply demand.

DISCUSSION

The proposed development plans for the Basin call for usable storage capacity of 229,500 acre-feet, and dead storage allocation of 100,100 acre-feet. Usable storage is for flood control, irrigation, power generation, and low flow regulation, with no provision for water that could be used to supplement the various water supply needs in the Basin. The importance of including storage for future municipal and industrial water supplies rests on considerations of the long-term benefits that could be derived from the increased water and the adverse effects of not developing the full potential of the reservoir sites.

The continued upward population and economic growth of the Basin will depend upon the utilization of its natural resources. Since water is the most important single asset in the economy of an area, the potential of the Basin depends primarily upon the quantity of water available, when and where it is needed, for full development use. Storage reservoirs are necessary to achieve the maximum beneficial use of the annual yield of water from the Basin. Because of the insufficient quantity of ground water in most of the heavily populated areas of the Basin, water supplies to meet the future requirements must be obtained from the surface waters, with the exception of the municipal supplies for Phoenix, Rogue River, and Cave Junction.

The proposed storage reservoirs on the Rogue River and its tributaries above Grants Pass will be beneficial for almost all of the municipalities as a means of supplying supplemental water to promote economic stability for the Basin. For the communities in the Illinois Valley and the upper part of the Bear Creek sub-basins, the proposed development plan would not be directly beneficial. Utilization of the stored water by these communities, would involve importation from a considerable distance by construction of separate pumping and transmission facilities. There are two other communities, Rogue River and Phoenix, for which beneficial use may occur later. These two communities presently use ground waters and believe that additional ground waters are available to be developed. Should they not materialize then the city of Rogue River could obtain water directly from the Rogue River and Phoenix could arrange for supplementing its water supply through the Medford municipal water system.

The quantity of supplemental water to meet the requirements of the year 2010 for municipalities is shown in TABLE 11, page 52. Analysis of this table shows that a total of 15,610 acre-feet of water annually by the year 2010 would be needed from surface water sources. However, the geographical locations of the cities dictate that only 12,300 acre-feet of the future water requirements could be economically obtained from the proposed storage projects now under consideration. Future water requirements of 3,310 acre-feet for the Ashland - Talent area would come from additional development of Ashland Canyon and/or utilization of water from the Talent Irrigation District.

In addition to the municipal water requirements of 12,300 acre-feet, it is estimated that the future industrial water requirements will range from 28,890 to 67,440 acre-feet annually. To meet these future water requirements, Lost Creek reservoir may be used or any combination of Lost Creek, Elk Creek and Lake Creek reservoirs may be applied. Meadows reservoir could meet the Grants Pass municipal water requirements or combine with the other reservoirs to meet the total water requirements in the Grants Pass area. Joint use of the reservoirs appears to be practicable because of timing of flood control and water supply needs and because releases for water supply can be used for power generation. Industrial development is expected to occur primarily in the Medford and/or Grants Pass area.

Utilization of the Rogue River in the Gold Beach area could benefit from any or all storage reservoirs on the main stem or its tributaries. However, the extent of industrialization to be expected and resulting water requirements are not sufficiently known to be included in this report. Logging operations have increased and other wood based industry is anticipated. These will not be large water users, however.

Annual benefits resulting from an increase in water quantity and dependability may be measured as the cost of obtaining the same quantity and quality of water by the cheapest alternative means that would most likely be developed by the potential water users in the absence of the Federal project. Considering the future water needs on an area basis, in lieu of individual municipal development, a site on McNeil Creek was selected for development of an alternate water supply. Construction of a storage reservoir at this site would benefit the same area as the proposed Federal project and would also permit use of the regular stream channel to transport the water to the Medford - Grants Pass area. Construction of a 20,000 acre-foot capacity, single-purpose reservoir on McNeil Creek to serve the Medford - Grants Pass area would meet the anticipated water needs for about 20 years at a cost of $6.5 million or $15 per acre-foot annually. The anticipated water needs are based upon the premise that industrial development will occur almost concurrently with the availability of adequate water supplies.

Using $15 per acre-foot as the cost of water, the annual benefits associated with the proposed Rogue River Basin development plan range from $617,850 to $1,196,100. Due to topographical conditions these benefits occur in the Medford - Grants Pass area. Distribution of the benefits would be:

Municipal waters

Grants Pass	$100,500
Medford	84,000

Industrial waters

Medford - Grants Pass area	$433,350 to $1,011,600

These figures are based upon the predicted water needs for the year 2010.

RECOMMENDATIONS:

It is recommended that:

(1) Periodic review be made of economic growth that may occur with advance in technological knowledge, resulting in greater utilization of the Basin's natural resources.

(2) Storage should be included in either, or a combination of, Elk Creek, Lewis Creek, Lakecreek, and Meadows reservoirs to meet the estimated future demand for municipal and industrial waters in the Medford - Grants Pass area. The stored waters could also be released to meet water demands that may materialize in the Gold Beach area.

(3) Consideration should be given to inclusion of water storage to satisfy water demands in the Gold Beach area in future developments of Copper reservoir. Such demands are presently indeterminate.

(4) Consideration should be given to future development of storage reservoirs in the Upper Bear Creek Sub-Basin in anticipation of future water requirements for the municipalities of Ashland, Talent, Phoenix, and Medford.

(5) The value of $15 per acre-foot per-year should be taken into account in estimating the annual benefits and economic value associated with inclusion of storage space in the proposed Basin development for future municipal and industrial water supplies.

(6) The municipalities and industries in the Basin be alert to the provisions of the Water Supply Act of 1958 in obtaining water storage space in Federal reservoirs to facilitate meeting future water requirements.

APPENDIX

UPPER ROGUE

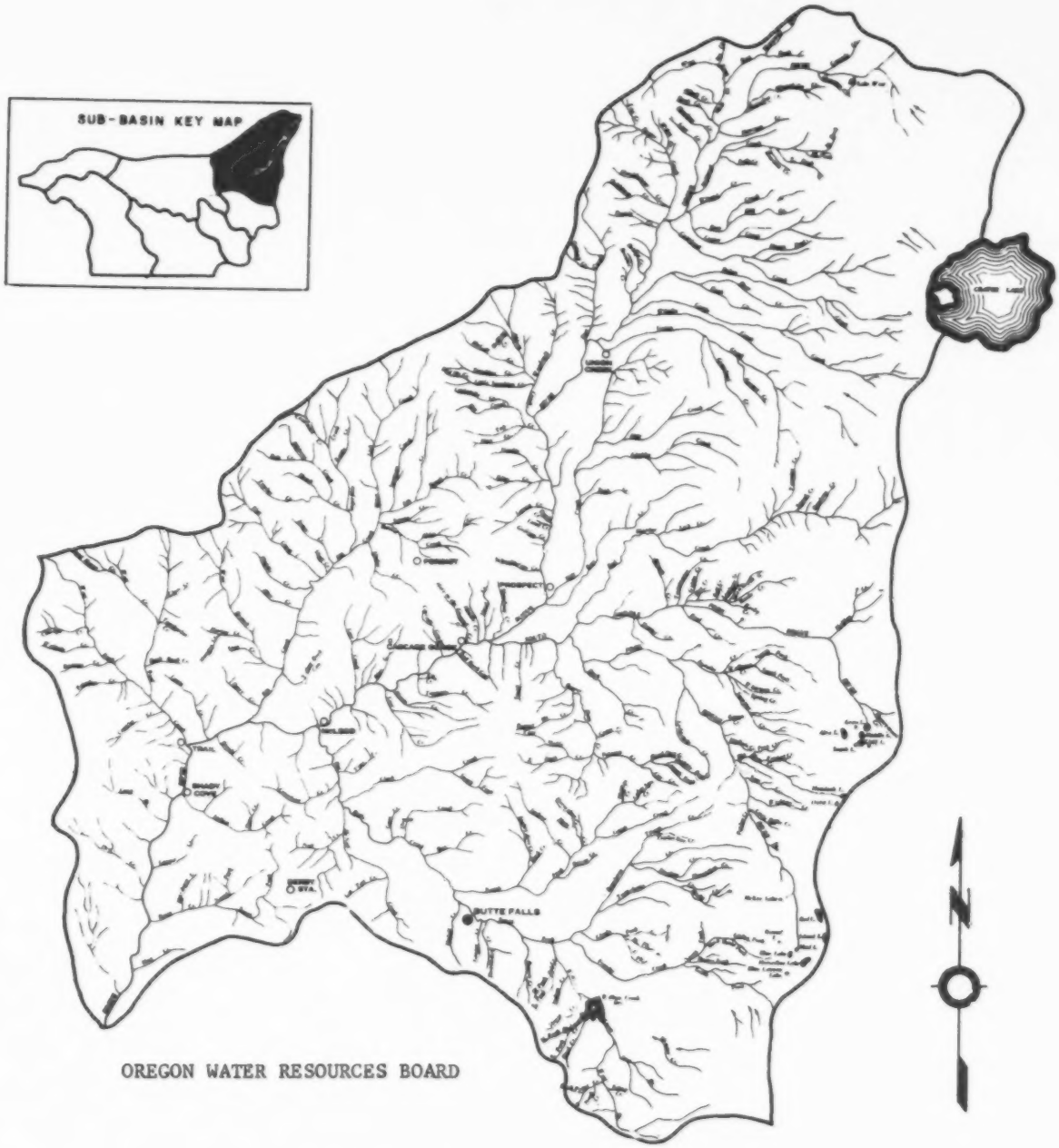


FIGURE I

LITTLE BUTTE CREEK

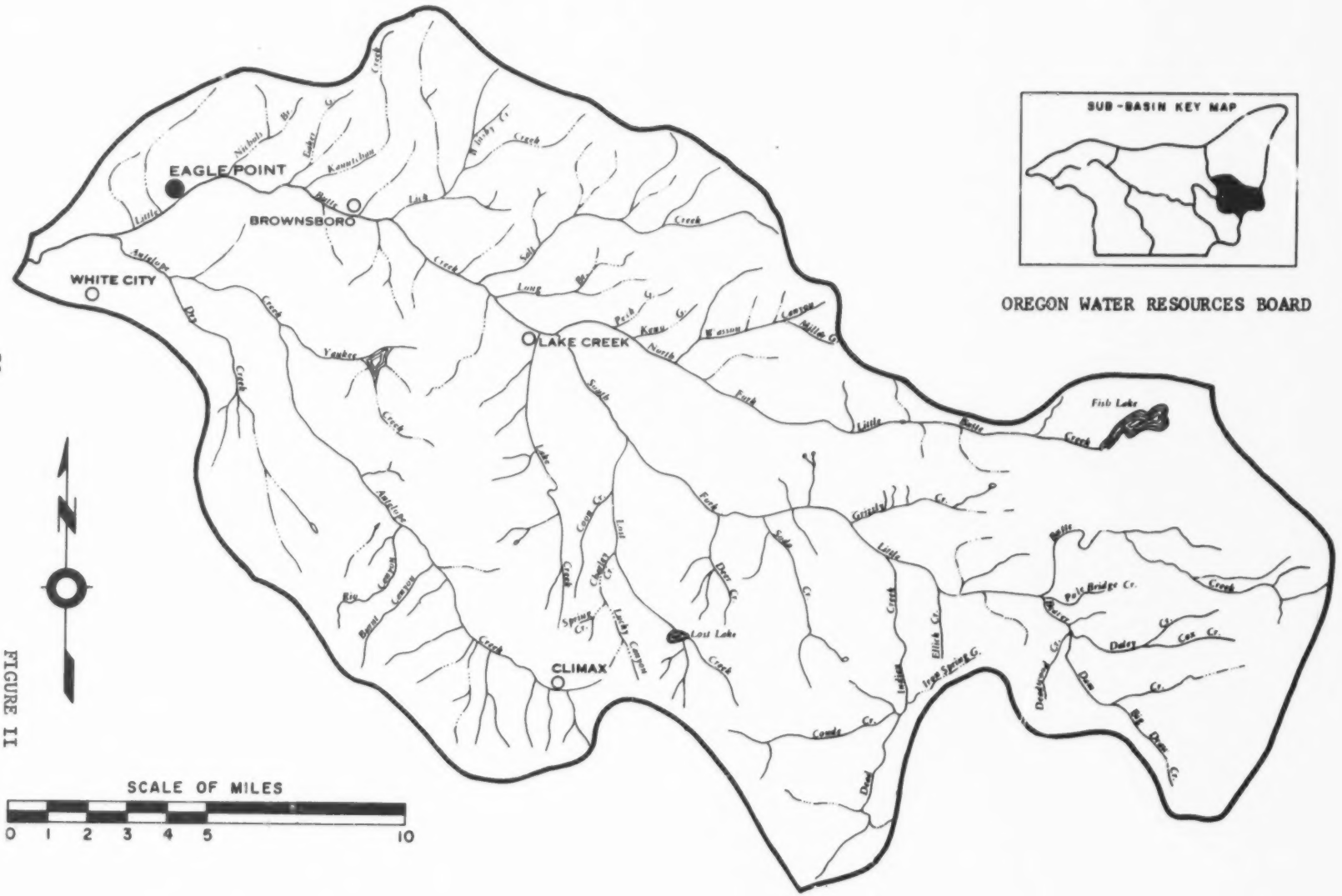


FIGURE II

BEAR CREEK

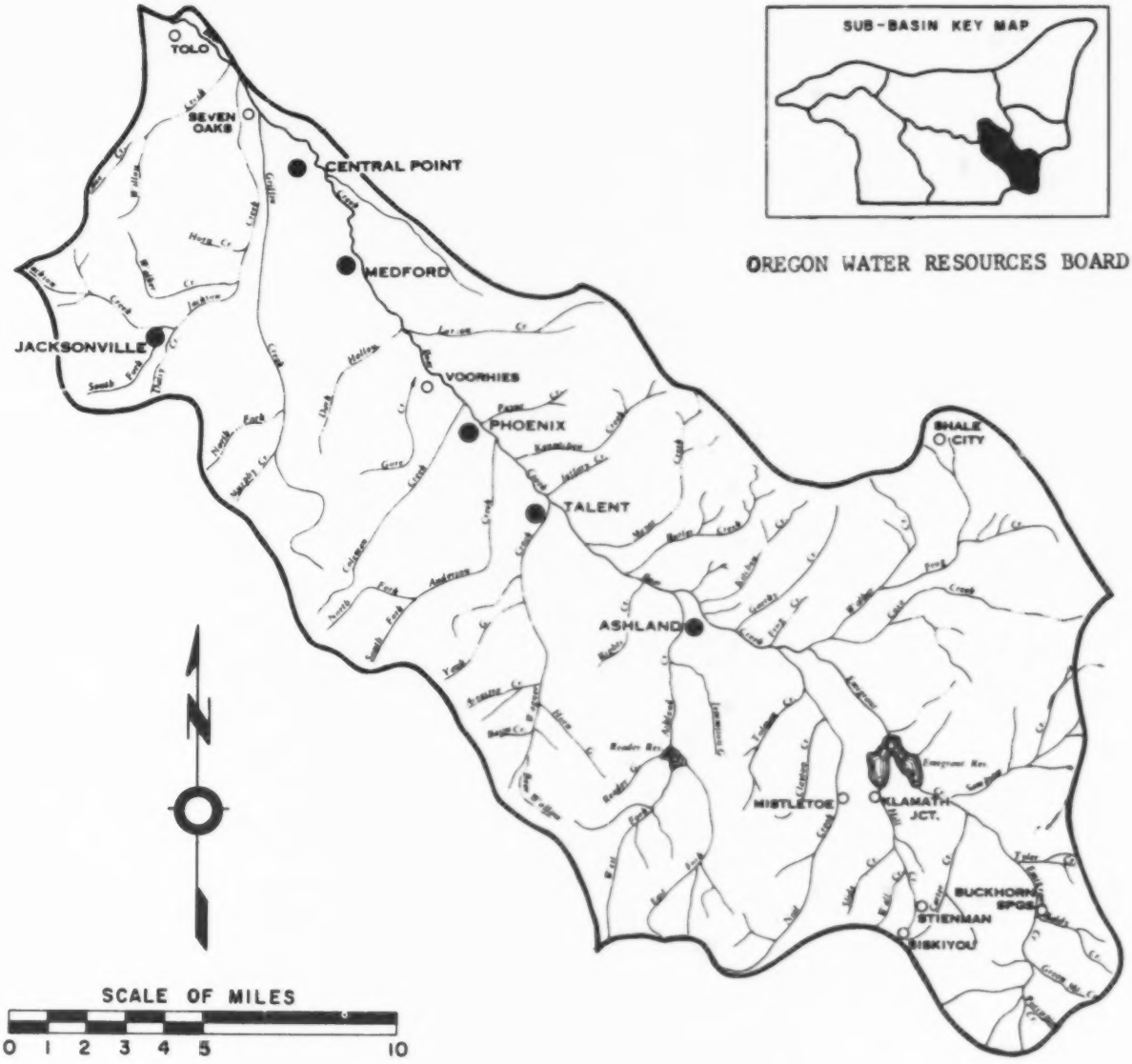
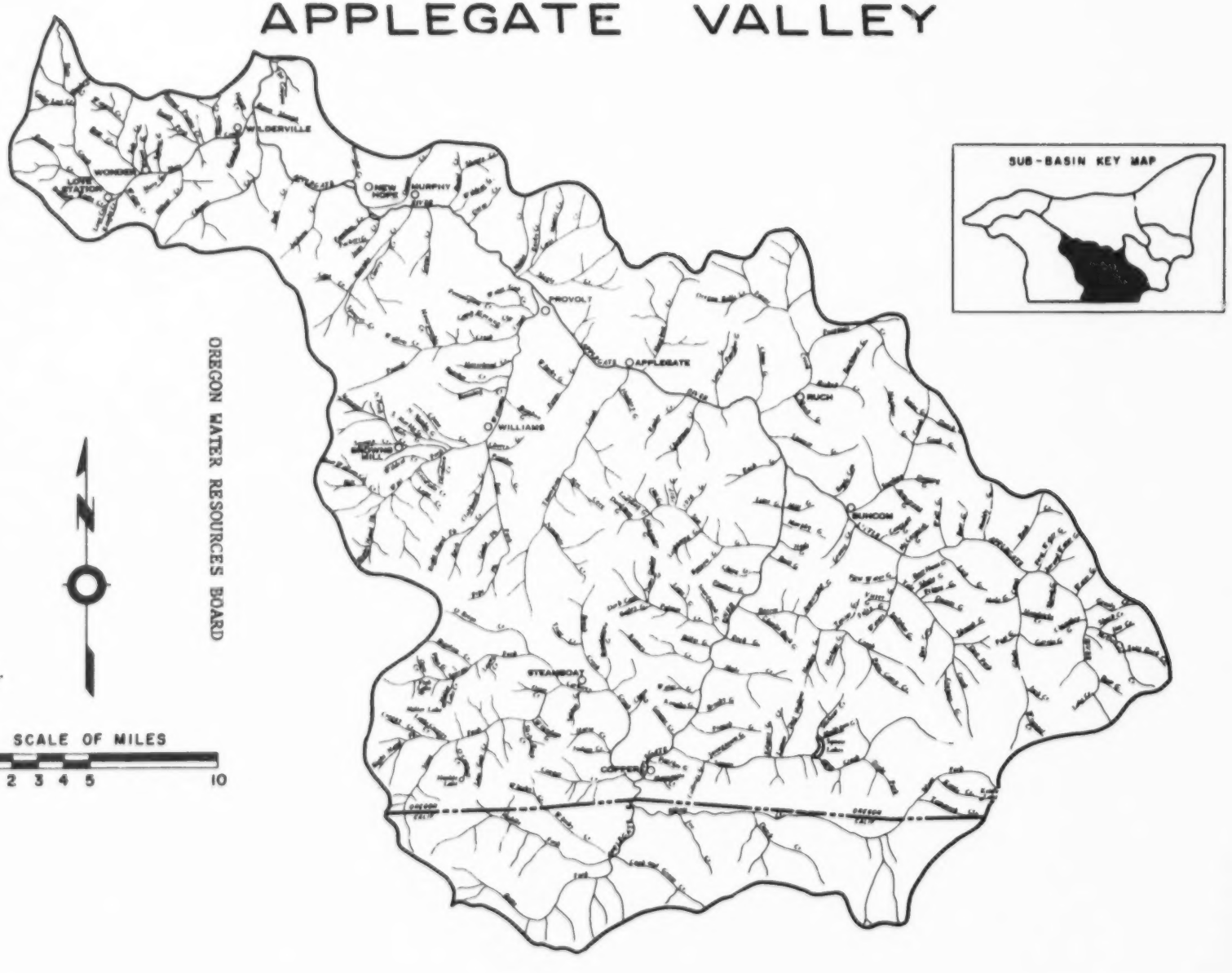


FIGURE III



OREGON WATER RESOURCES BOARD

FIGURE IV

MIDDLE ROGUE

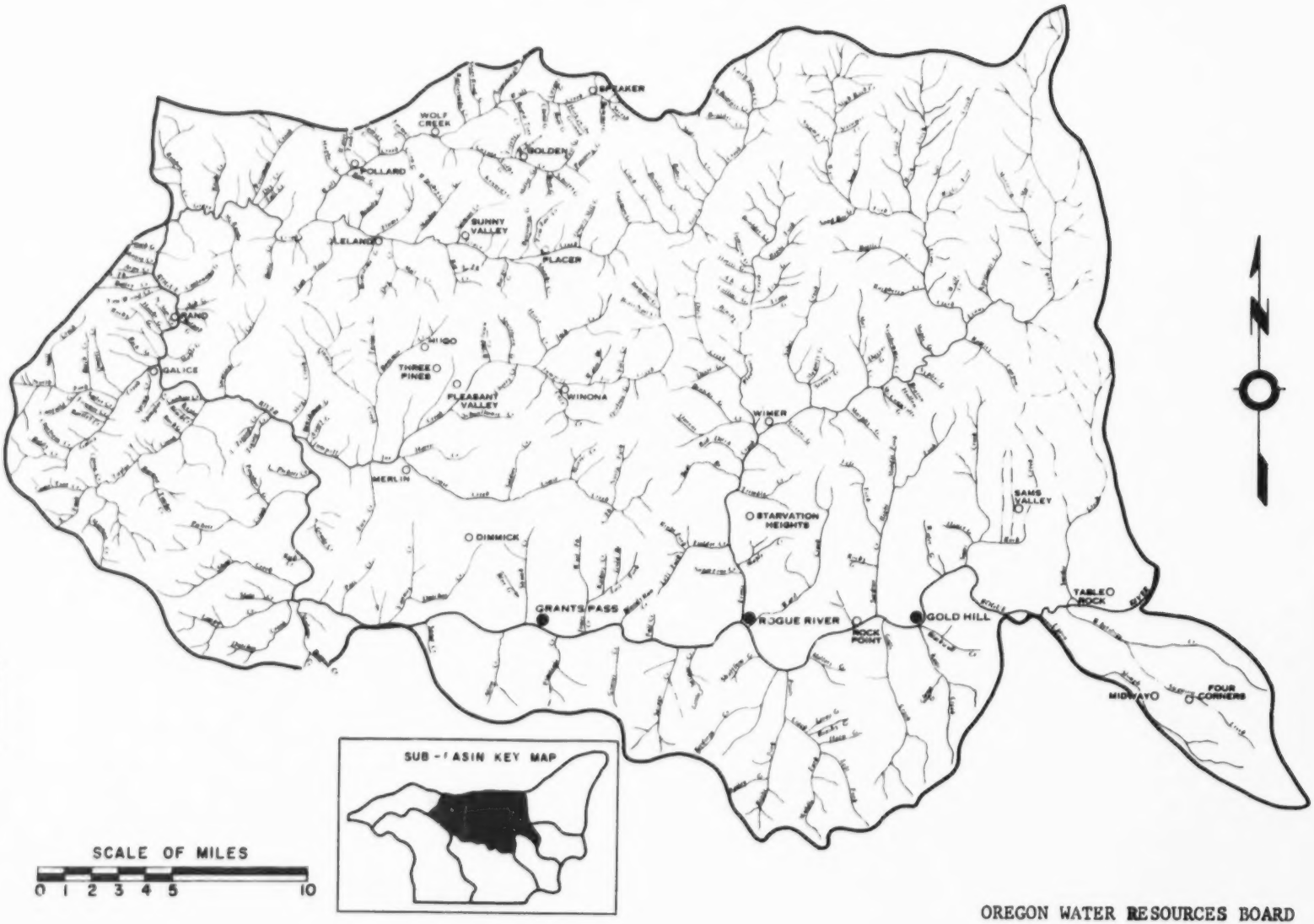


FIGURE V

OREGON WATER RESOURCES BOARD

ILLINOIS VALLEY

OREGON WATER RESOURCES BOARD

FIGURE VI

LOWER ROGUE

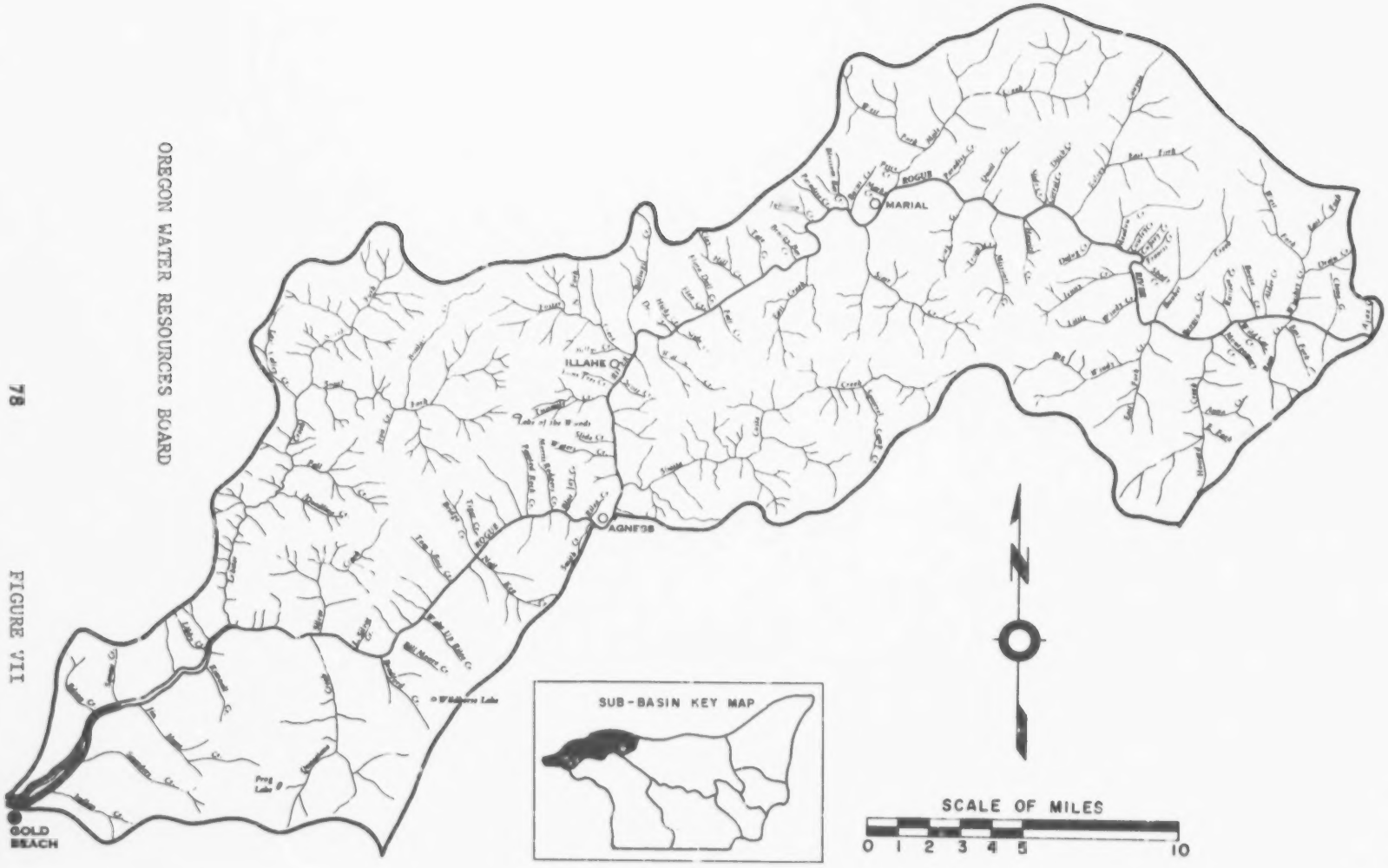


FIGURE VII

TABLE I

ASHLAND
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	20	25	40	15 1 0	45	40
February	20	40	35	40	20	30
March	25	30	40	35	35	65
April	20 5 1	40	40	45	55	35
May	20	30	40	40	45	
June	25 1 0	30	30	40	40	
July	10	30	35	40	55	
August	25 1 0	50	30	50 1 0	40	
September	20	25 7 1	30	30 1 0	35	
October	20	30 2 0	50 1 0	20	30	
November	40	20 5 1	40	40	50	
December	20	40 9 1	10	50	50	
TOTALS	260 7 1	400 1 0	410 1 0	445 3 0	500	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE II

BUTTE FALLS
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January						5
February		5		10		
March				10	5	10
April	5	5		5		5
May	5	5			5	
June		5		5	5	
July	5					
August	5			5		
September	5					
October	10	5	5		5	
November	5					
December				5		
TOTALS	40	25	5	40	20	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE III

CAVE JUNCTION
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January		5	5	5	5 2 0	5
February	5	5	10	5	5	10
March		5	5	5		10
April		5		20 3 1		5
May				10		
June		5	5	10		
July				5		
August	5 5 1	5				
September	10 1 0	10				
October	5	5	5	5	50 21 5	
November	10	15 11 2		10 1 0	10	
December		5	5	5	10	
TOTALS	10 6 1	65 11 2	35	80 4 1	80 23 5	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE IV

CENTRAL POINT
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	10	10	10	10	10	10
February		10	10	10	10	5
March	20	10	10	10	10	15
April	10	10	10	10	10	10
May	10	10	10	10	10	
June	10	10	10		15	
July	10	10	15	10	5	
August	10	10		15	10	
September	10	10	10	10	15	
October		10	10		10	
November	5	10	10	10	10	
December		10	10	10	10	
TOTALS	95	120	115	105	125	

* Data Supplied by the Oregon State Board of Health
** January, February, March, April

TABLE V

EAGLE POINT
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January						5
February	5	5	5	5	5	
March		5	5			5
April	5	5				5
May						
June		5			5	
July	5			5	5	
August		5	5	5	5	
September						
October			5		5	
November		5		5		
December						
TOTALS	15	30	20	20	25	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE VI

GRANTS PASS
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	20	25	50 6 1	40 1 0	55	60
February	30	30	30 6 0	40	60	60
March	50	35	30 4 0	40	85	75
April	40	30	45 1 0	75	95	70
May	40	40	40 1 0	40 1 0	60	
June	40	30	40	35	100	
July	40	20	20	40	60	
August	30	45 1 0	40 3 0	60 5 1	55	
September	40	40 5 1	20	65 3 0	95	
October	25	30	40	55	65	
November	20	45	40	60	60	
December	20	35	30	75	15	
TOTALS	395	405 6 1	425 21 1	625 10 1	805	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE VII

GOLD BEACH
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959	**
January					15 6 1	15 2 0	
February					5 2 0	5	
March				10 4 1	15		
April						5	
May		50 25 6					
June					5		
July	5 2 0		15 4 1		5		
August	5		25 19 5	25 8 2	5		
September			5 1 0		15 5 1		
October			5 5 1		5		
November			5 5 1		5		
December					5		
TOTALS	10 5 0	50 25 6	55 34 8	35 12 3	80 13 2		

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE VIII

GOLD HILL
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	5	10	10	10	10	5
February	5		10	10 5 1	10	
March	5	10	10	5	10	10
April	5	5	10	5	10	5
May	10	10	10	15	5	
June	5	5	10	5		
July	5	10			5	
August	5	15	10	10	5	
September	10		10	10	5	
October	5	5	10	5	5	
November		15	5 3 1	10	5	
December	10	5	10	10	5	
TOTALS	70	90	105 3 1	95 5 1	75	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE IX

JACKSONVILLE
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	5	5		5	5	5
February	5	5	5	5	5	5
March	5			5	5	
April	5	5		5	5	
May	5	5	5	5		
June	5	5	5		5	
July	5	5		5		
August	5	5	5	5		
September	5	10		5	5	
October	5		5	5	5	
November	5	5	5 1 0	5	5	
December	5	5	5	5	5	
TOTALS	60	55	35 1 0	55	45	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE X

MEDFORD
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	80	120	110	135	130	115
February	80	95	135	115	95	110
March	80	125	150	140	110	85
April	60	125	160	120	125	110
May	100	125	130	140 6 1	90	
June	110	100	155	120	100	
July	100	100	125	100	105 1 0	
August	100	105	155	150	135 1 0	
September	100	100	100 1 0	155	115	
October	100	100	165	130	115	
November	80	110	85	130	110	
December	100	80	130	120	170	
TOTALS	1090	1285	1600 1 0	1555 6 1	1400 2 0	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE XI

PHOENIX
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January	10	5	5	5	5	5
February		5	5	5	5	5
March	10	5	5	5	5	5
April	5	5	5	5	5	5
May	5	5	5	10	5	
June		5	5		10	
July	5	5	5	5	5	
August		5	5	5	5	
September	15		5	5	5	
October		10	5	10	5	
November	5		5	5	5	
December	5	5	5	5	5	
TOTALS	60	55	60	65	65	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE XII

PROSPECT
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive samples
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January		5				5
February		5	5		5	
March	5		5	5	5	5
April	5	5	5	5	5	
May	5	5		10		
June	5	5	5		5	
July	5	5	5	5	5	
August	5	5	5	|| 15 6 1	5	
September	5		5	5	5	
October			5			
November	5	10	5	5		
December	5				5	
TOTALS	45	45	45	50 6 1	40	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE XIII

ROGUE RIVER
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY*

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January		5		10		10
February		15		5 2 1		15
March	5	5		15	5	10
April		5		5	10	
May	5	5	5	5 3 1	5	
June	5	10		5	10	
July	10			5	15	
August	5 1 1	5	5		5	
September	5		5		5	
October		10			20	
November	5		5		10 2 0	
December		5		5	5	
TOTALS	40 1 0	65	20	55 8 2	90 2 0	

* Data supplied by the Oregon State Board of Health
** January, February, March, April

TABLE XIV

TALENT
SUMMARY OF BACTERIOLOGICAL ANALYSIS OF WATER SUPPLY *

1st line number of 10 ml. portions per month
2nd line number of positive portions per month
3rd line number of samples having 3 or more positive portions
|| denotes month in which standards were exceeded

	1954	1955	1956	1957	1958	1959 **
January					5	5
February				5	5	5
March				5	5	5
April	5			5	5	5
May		5	5	15 1 0	5	
June					5	
July				5	5	
August		5	5	5	5	
September			5	5	5	
October			5	5	5	
November				5	5	
December				5	5	
TOTALS	5	10	20	60 1 0	60	

* Data supplied by the Oregon State Board of Health
** January, February, March, April